Conclusions With either IBTR or MCBC the size of the second tumour is important, patients with cancers >2 cm in diameter being at a significantly greater risk of death. Lead-time bias from the mode of detection may be a factor in these results. The frequency of surveillance mammography should be considered for maximum benefit.

O4

Reduced breast biopsy rates with a combined high temporal and high spatial resolution MR imaging protocol at 3 Tesla

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Purpose To develop a 3.0 Tesla breast imaging protocol that combines high temporal and spatial resolution 3D MR sequences for quantitative time course and morphological analysis of breast lesions.

Materials and methods One hundred and sixty-five breast lesions classified by mammography or ultrasound as BIRADS 4 and 5 were included in this prospective IRB-approved study. The MRI protocol consisted of a coronal T2-weighted TIRM and a coronal combined high temporal and spatial resolution T1-weighted sequence before and after application of a standard-dose Gd-DOTA (VIBE with a high temporal resolution of SI 1.7 mm isotropic; TA 3.45 min for 17 measurements; FLASH with high spatial resolution of SI 1 mm isotropic; TA 2 min). Lesion size and morphology were assessed according to the BIRADS classification. ROIs for suspicious areas were manually drawn and evaluated for contrast-enhancement behavior by plotting intensity courses against time. Sensitivity and specificity with a 95% confidence interval and the negative predictive value (NPV) and positive predictive value (PPV) were calculated. Diagnostic accuracy was assessed. The histopathological diagnoses were used as the standard of reference.

Results All malignant breast lesions were identified correctly with a sensitivity of 100%, a specificity of 84% and a diagnostic accuracy of 95.7%. PPV was 0.94 and a NPV 1. All seven false positive lesions were lesions with atypia.

Conclusions The proposed combined 3 Tesla MR imaging protocol, comprising both high temporal and spatial resolution, enabled an accurate detection and assessment of breast lesions with high sensitivity and specificity reducing false positive breast biopsies

O5

MR visible only lesions: what are the predictors for malignant outcome?

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Introduction To correlate pathological outcomes of MRI vacuum biopsies on MRI visible only breast lesions with lesion morphology, time-enhancement curves and clinical indications to determine the use of these as predictors for malignancy.

Methods A retrospective analysis of 277 patients referred for MRI-guided vacuum biopsies of impalpable breast lesions visible only on MRI was performed. All patients had a minimum follow-up period of 11 months. MRI biopsies were undertaken on a 1.5 T magnet using a minimum of 12 passes of vacuum-assisted biopsies. The pathological findings were correlated against BI-RADS appearances and time-enhancement characteristic of the lesions and against the clinical indications for MRI examination.

Results A total of 286 vacuum biopsies were undertaken. Eighty-one were malignant (28.3%), of which 72.8% are masses and 27.2% are nonmasses. Only two malignant lesions had a type 1 curve (2.5%), compared with malignant lesions with type 2 (54.3%) and type 3 curves (43.2%). Both malignant lesions with type 1 curve had a suspicious morphology. Nonmalignant lesions with type 3 enhancement included lymph nodes, fibroadenomatoid hyperplasia, papillary lesions, fibrocystic change and lobular neoplasia.

Conclusions Lesion morphology and time-enhancement curves are useful predictors of malignancy and can be used to develop an algorithm to help direct appropriate biopsy of MRI-detected lesions. We recommend that in the absence of suspicious morphology, only lesions with type 2 and type 3 curves should be subjected to MRI-guided biopsy.

O6

Comparison of film screen, computed radiography and direct digital mammography in the Southern Derby screening programme

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Introduction Our screening programme has been fully digital since April 2009 and utilises a combination of computed radiography (CR) (Fuji Profect) and three direct digital mammography (DDM) mammographic systems (Fuji Amulet, GE DS and GE Essential). This study compares the performance of our CR and DDM systems against film screen (FS) mammography in a real-life screening environment.

Methods Southern Derbyshire screening episodes between April 2007 and April 2010 were interrogated on NBSS using a Crystal report. Recall and cancer detection rates were collected according to mammography type. Data were analysed for significance using the chi-squared test.

Results A total of 66,989 screening episodes were recorded, 22,039 FS (recall rate 3.23%, cancer detection 8.08/1,000), 30,739 CR (recall rate 2.73%, cancer detection 7.87/1,000) and 14,157 DDM (recall rate 3.87%, cancer detection 9.89/1,000). Recall rates compared with FS were statistically significantly different for CR ($P = 0.0007$) and DDM ($P = 0.0016$). Cancer detection rates compared with FS mammography were not significantly different for either CR ($P = 0.833$) or DDM ($P = 0.081$), although there was a significant difference found between CR and DDM ($P = 0.035$).

Conclusions DDM in our programme has detected an increased number of cancers but at an increased recall rate. CR has detected a similar number of cancers as FS mammography at a lower recall rate and the study supports the use of CR in our programme. As an interim measure in changing to a fully DDM service it has allowed us to spread costs whilst adopting a single digital workflow, which is efficient and safe for our clients.

POSTER PRESENTATIONS

P1

Breast density as a predictor of breast cancer risk

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Introduction As a part of a retrospective study of computer-aided detection in breast cancer screening, we recorded the percentage of the breast density on a visual analogue scale on 4,866 routine screening mammograms taken in 1996 as part of the North East of Scotland Breast Screening Service. In these women, 284 breast cancers were diagnosed from the time of the original mammograms up until February 2010.

Methods The main goal was to evaluate breast density as a breast cancer risk factor by detection mode, histology and time since the original mammogram. The association of density with risk of breast cancer was assessed using logistic regression giving odds ratios per 10% increase in density, and by comparison of continuous mean densities between particular groups of cancers and those who did not develop breast cancer.

Results After adjusting for age, breast density was significantly associated with cancer in the first 6 years after the original mammogram (OR per 10% density = 1.08, 95% CI = 1.01 to 1.15, $P = 0.03$), but not with cancer more than 6 years after the mammogram (OR = 1.01, 95% CI = 0.93 to 1.10, $P = 0.8$). There was a statistically significant association between histological type of tumour and breast density ($P = 0.02$). The mean densities for no cancer, invasive ductal carcinoma, DCIS and invasive lobular carcinoma were 32% (SD 23%), 33% (21%), 35% (26%) and 44% (24%), respectively. The effect of density on risk varied significantly by detection mode ($P = 0.02$), with highest densities being observed in interval cancers arising more than 1 year after the mammogram (55% compared with 32% in those with no cancer).

Conclusions Breast density as measured by visual analogue assessment is strongly associated with late interval cancers and with lobular carcinoma. Its predictive value for risk, however, declines with time since its measurement.