

P14

Can touch imprint cytology replace fine needle aspiration within current clinical practice?

H Kinkaid, J Yarr, SR Hall, G McCusker, M McStay, GM Briggs
Southern Health and Social Care Trust, Portadown, UK
Breast Cancer Research 2010, **12**(Suppl 3):P14 (doi: 10.1186/bcr2667)

Introduction To investigate whether touch imprint cytology (TIC) of needle core biopsy (NCB) is as effective as fine needle aspiration cytology (FNAC) for providing same-day diagnosis of benign and malignant breast lesions at our one-stop symptomatic breast clinic.

Methods We prospectively studied 426 women with image-detected breast lesions who underwent FNAC and NCB with subsequent TIC. All of the FNAC and TIC samples were sent for immediate reporting. These were read by one of five consultant cytopathologists. The TIC results were subsequently compared with the definitive histopathology from either the core biopsy or the final surgical specimen.

Results Complete data were present for all patients. TIC was compared with FNAC in providing an accurate and definitive same-day diagnosis in lesions graded C2 (benign) and C5 (malignant). For FNAC, C2 = 75/426 and C5 = 210/426 allowing 66.8% of women a definite same-day diagnosis. For TIC, C2 = 92/426 and C5 = 223/426 allowing 73.8% of women a definite same-day diagnosis. There were no false positive results.

Conclusions The accuracy of TIC is at least equivalent to FNAC when used as a stand-alone technique for definitive same-day diagnosis from a single biopsy. We therefore conclude that FNAC is no longer necessary, thus saving a second invasive procedure.

P15

A novel threshold-independent computer-aided detection algorithm for breast MRI

O Hatsiopoulou¹, O Kubassova², I Jolley¹, C Ingram¹
¹Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK; ²Image Analysis Ltd, Leeds, UK
Breast Cancer Research 2010, **12**(Suppl 3):P15 (doi: 10.1186/bcr2668)

Introduction Image degradation due to motion artefact in breast MRI represents a diagnostic challenge. Tumours are often detected manually by a radiologist or with computer-aided detection (CAD) systems, which utilise areas of enhancement that meet a predefined threshold. The aim of this study was to test a new threshold-independent CAD algorithm and to correlate its findings to the conventional manual analysis.

Methods CAD was tested on retrospectively acquired MRIs of 14 patients with pathologically proven carcinomas. CAD results were obtained in a fully automated manner and the expert was blinded to the CAD findings. Noise artefacts were eliminated with the patient motion reduction algorithm and suspicious tissues were delineated using a novel all-timepoint-based, threshold-independent parametric map approach. The algorithm evaluates the shape of the curve as a whole and uses the noise integral to the image to discriminate malignant from benign tissues.

Results All CAD-identified tumours and generated kinetic curves were comparable with those of the manual analysis. In particular, tumour conspicuity was enhanced in two cases where image degradation by motion artefacts made data interpretation challenging to conventional analysis. See Figure 1.

Conclusions CAD results were favourably viewed by experts and 100% correlated to conventional manual tumour detection. In particular, CAD

appears to increase tumour conspicuity in cases with motion artefacts. Prospective analysis is required to test this model further.

P16

Educational abstract

Educational abstract not submitted for online publication.
Breast Cancer Research 2010, **12**(Suppl 3):P16 (doi: 10.1186/bcr2669)

P17

Clinical value of hybrid imaging for staging breast cancer in a district general hospital

FR Canavan, E Lloyd, D Jones, J Edwards, M Powell
Wrexham Maelor Hospital, Wrexham, UK
Breast Cancer Research 2010, **12**(Suppl 3):P17 (doi: 10.1186/bcr2670)

Introduction Hybrid imaging, integrating anatomical computed tomography (CT) with functional single-photon emission computed tomography (SPECT), has emerged as a powerful diagnostic tool in breast cancer imaging. This dual modality increases the specificity of skeletal scintigraphy in detecting bony metastases and achieves accurate sentinel lymph node mapping, directly influencing the surgical approach. For patients with high-grade breast cancer, hybrid SPECT/CT provides the opportunity for a 'one-stop shop' with important implications for patient care, cost-effectiveness and follow-up.

Methods We included 50 women with >15 mm grade 2 or grade 3 invasive breast cancer attending our imaging department over 6 months. Each underwent SPECT/CT imaging protocol using a 16-slice Phillips Precedence. A questionnaire assessed type/number of imaging visits and perceived anxiety levels. Change to patient management, radiation dose and estimated costs were also collected from the trust patient and imaging information systems and multidisciplinary notes, to assess overall value.

Results One-third of patients underwent significant change in medical or surgical management based on hybrid imaging. Overall, >90% of patients surveyed reported higher satisfaction following a 'one-stop' visit. Cost and total radiation dose of combined imaging were more favourable than for single visits.

Conclusions Whilst hybrid SPECT/CT in breast imaging remains in its infancy, its potential to add value for the clinician and patient is clear. The positive advantages for patient management and convenience/cost suggested in our pilot study suggest it is likely to influence future breast cancer management protocols.

P18

Comparison of 1.5T and 3T in assessment of suspicious breast lesions

SK Arcot Ragupathy¹, T Gagliardi¹, TW Redpath², S Flynn¹, B Jagpal², JKP Begley², FJ Gilbert²
¹Aberdeen Royal Infirmary, Aberdeen, UK; ²University of Aberdeen, UK
Breast Cancer Research 2010, **12**(Suppl 3):P18 (doi: 10.1186/bcr2671)

Introduction MRI at 3T has advantages of increased spatial and temporal resolution but with known transmit field inhomogeneity problems. The objective of this study is to compare the confidence in characterising the breast lesions in 1.5T and 3T MRI examinations performed and to compare the conspicuity of the lesions.

Materials and methods Patients referred for a diagnostic MRI examination as part of their clinical work-up for a suspicious lesion or for preoperative

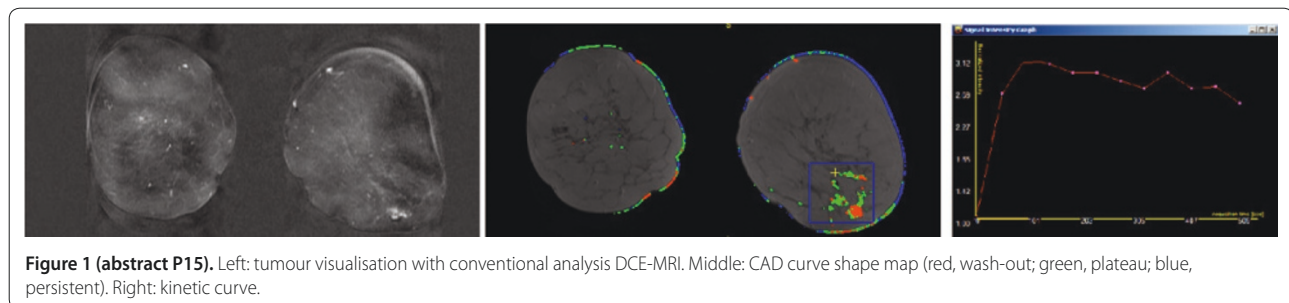


Figure 1 (abstract P15). Left: tumour visualisation with conventional analysis DCE-MRI. Middle: CAD curve shape map (red, wash-out; green, plateau; blue, persistent). Right: kinetic curve.

staging were recruited into this study following informed consent. The MRI was undertaken on a 1.5T GE CVi/NVi (Milwaukee, WI, USA) and a 3T Philips Achieva (Best, the Netherlands). T2W, dynamic T1W (voxel size 0.85 x 1.19 x 2 mm – 1.5 T MRI, and 0.6 x 0.6 x 2 mm – 3T MRI) and high-resolution fat-suppressed T1W postcontrast sequences (single-dose contrast) were carried out. The confidence level in morphology and contrast kinetics (three-point scale) and conspicuity for each lesion (five-point scale, –2 to +2) was assessed by a single observer (SKAR).

Results Seventeen patients were included in the study. Eleven patients had one or more lesions, giving 22 lesions. The confidence level in assessing morphology was high in 16/22 and 19/22 and in assessing contrast kinetics was high in 12/22 and 16/22 in 1.5T and 3T examinations, respectively. The mean and standard deviation of the conspicuity score are 1.09 ± 0.88 for 3T. **Conclusions** The confidence in characterising and conspicuity of the breast lesions is improved and no lesions identified at 1.5T were missed at 3T MRI. 3T MRI can be used safely in clinical practice.

P19 Effect of region of interest size in quantitative diffusion-weighted magnetic resonance imaging of the breast

N AlRashidi, T Gagliardi, T Ahearn, T Redpath, F Gilbert
University of Aberdeen, UK
Breast Cancer Research 2010, 12(Suppl 3):P19 (doi: 10.1186/bcr2672)

Introduction In breast MRI, morphological and dynamic enhancement features determine whether a lesion is benign or malignant but specificity is low. Diffusion-weighted magnetic resonance imaging (DW-MRI) measures microscopic motion of water and gives quantitative measurement known as the apparent diffusion coefficient (ADC). This study was conducted to determine whether the whole of the lesion should be included within the region of interest (ROI) or whether a small ROI would differentiate benign from malignant disease.

Methods Fifteen female patients with 15 suspicious lesions were imaged on a 3T MRI machine (Philips HealthCare, Best, the Netherlands). DW-MRI was performed with b-values of 0, 150, 800 s/mm² using single-shot SE-EPI (TR/TE = 9,543 ms/50 ms). The ROI of the lesion and of fibroglandular tissue was used to calculate ADC values. Histology or follow-up data were available for all lesions.

Results The mean ADC value of malignant lesions (13) from two small ROIs was 0.954 ± 0.145 mm²/second and for benign (2) was 1.69 ± 0.17 mm²/second (Figure 1a). The ADC values for the whole lesion were 1.027 ± 0.23 mm²/second and 1.78 ± 0.293 mm²/second, respectively (Figure 1b).

Conclusions There is a significant difference between ADC values from large and small ROIs ($P < 0.05$), with small ROIs giving greater differentiation. DWI is a promising technique to improve specificity of breast MRI.

P20 Negative predictive value for atypia and malignancy of 14-gauge core biopsy of breast papillomas

GT Mataka, MJ Pearson, AJ Maxwell
Royal Bolton Hospital, Bolton, UK
Breast Cancer Research 2010, 12(Suppl 3):P20 (doi: 10.1186/bcr2673)

Introduction Papillary lesions of the breast may be heterogeneous and associated with atypia or frank malignancy. Current practice is to perform wider sampling of lesions showing benign papilloma on core biopsy because of the risk of underestimation of disease. The literature, however, is unclear about the negative predictive value (NPV) of 14-gauge needle core biopsy for atypia or malignancy.

Methods A retrospective review of image-guided biopsies performed over an 11-year period from January 1999 to December 2009 was undertaken. We identified cases with a 14-gauge core biopsy diagnosis of benign papilloma. Patients with atypia or malignancy on core biopsy were excluded. The imaging features and number of core samples were documented. All patients subsequently underwent lesion excision.

Results Seventy-eight patients had a diagnosis of a benign papilloma on core biopsy. Subsequent excision was with vacuum-assisted biopsy in 48 and surgery in 30. Twenty-eight patients with microcalcification had a stereotactic-guided biopsy. Fifty patients with a mass had ultrasound-guided biopsy. Atypical ductal hyperplasia was found in three out of 28 (11%) who had microcalcification (mean number of 10 cores) and one out of 50 (2%) with a mass (mean number of three cores). Seventy-four (95%) patients had a benign papilloma only.

Conclusions The NPV for atypia and malignancy of 14-gauge core biopsy of papillomas is 95% in this series. Underestimation of disease is more common in lesions presenting with microcalcification. The current practice of wider sampling of all papillary lesions diagnosed on 14-gauge core biopsy should continue.

P21 Educational abstract

Educational abstract not submitted for online publication.
Breast Cancer Research 2010, 12(Suppl 3):P21 (doi: 10.1186/bcr2674)

P22 Educational abstract

Educational abstract not submitted for online publication.
Breast Cancer Research 2010, 12(Suppl 3):P22 (doi: 10.1186/bcr2675)

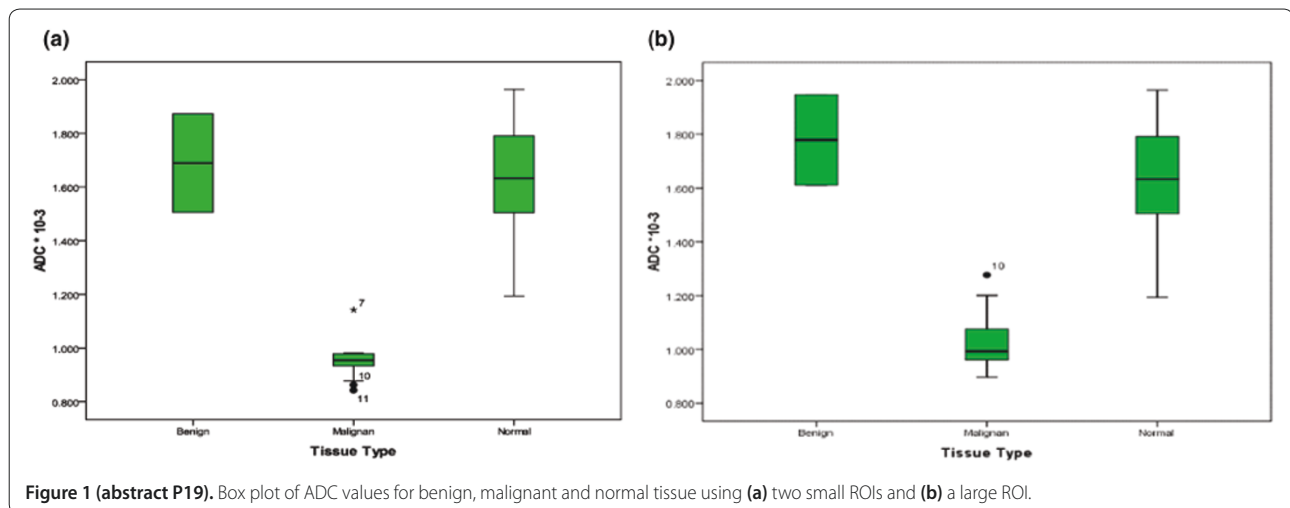


Figure 1 (abstract P19). Box plot of ADC values for benign, malignant and normal tissue using (a) two small ROIs and (b) a large ROI.