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Symposium Mammographicum 2010 Meeting Abstracts

Symposium Mammographicum is a UK registered charity founded in 1979. Its principal aims are to stimulate and support research and disseminate knowledge about the prevention, diagnosis and treatment of breast disease.

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Invited speaker abstracts Monday 12 July

09.20-09.55 Session 1
The Sir John Stebbings Lecture

Addressing Inequalities in Cancer Care
Speaker: Mike Richards CBE
National Clinical Director for Cancer

Considerable progress has been made on breast cancer in recent years. Two decades ago death rates in the UK were amongst the highest in the world. Since then the fall in mortality has been steeper in this country than in any other country. Over a thirty year period five year survival rates have improved from around 50% to over 80%. These improvements are likely to be due to a combination of factors including the introduction of breast screening and new treatments and better organisation of cancer services, particularly through multidisciplinary team working. However, breast cancer remains a major killer and the UK lags behind other developed countries in two important respects. First, breast cancer mortality in older women is falling much more slowly in this country than elsewhere. Second, one year survival rates in this country are well below those achieved elsewhere – almost certainly reflecting late diagnosis. A National Awareness and Early Diagnosis Initiative (NAEDI) has been established jointly by the Department of Health and Cancer Research UK to tackle this. Key aspects of this initiative will be described.

09.55-10.55 Session 2
Overview of achievement against key CRS aims

2.1 09.55-10.10 - Symptomatic Breast Services: meeting the waiting time targets while maximising quality
Speaker: Martin Lee
Consultant Breast Surgeon, University Hospital Coventry

The National Health Service (NHS) is committed to a maximum two-week wait from urgent GP referral to first outpatient appointment for all suspected cancer referrals, one-month wait from diagnosis to treatment, and two-months from urgent referral to first treatment of all cancers. In addition the Cancer Reform Strategy (CRS), determined that all patients with breast symptoms must be seen within two weeks of referral to a specialist, even if cancer is not suspected, which is now a "Vital Sign" in the 2010/11 NHS Operating Framework.
This additional demand for symptomatic diagnosis is happening as we plan expansion of the NHS Breast Screening Programme; hence hospital breast units have a challenging task in meeting overall targets for diagnosis and treatment of all breast cancers. Awareness of these pressures recently led the CRS Breast Cancer Working Group to produce "Best practice diagnostic guidelines for patients presenting with breast symptoms" using multidisciplinary expert input and peer review, and with the support of the Department of Health and Breakthrough Breast Cancer.
They cover diagnostic triple assessment of women referred with breast symptoms, and encourage involvement of all suitably trained members of the multidisciplinary team. Recognising the changes in diagnostic pathways over the past decade, there are strong emphases on one-stop assessment, image-guided needle-core biopsy, and avoidance of mammography where possible, particularly under 40 years. The guidelines are being rolled out through Cancer Networks, and their impact will be measured by quality markers collected through the new national breast cancer dataset.

2.2 10.10-10.25 - Elevated risk categorisation
Speaker: Lars Holmberg
King's College London, UK

High-risk screening taskforce under the Advisory Committee on Breast Cancer Screening
(Gillian Reeves, Caitlin Palframan, Louise Izatt, Michael Michell, Robin Wilson, Ken Young, Ian Ellis, Lars Holmberg)
The Advisory Committee on Breast Cancer Screening set up a taskforce in 2009 to look at consequences of more intensive screening for women at high risk of breast cancer. The main objective was summarised as follows:
To develop practical recommendations, based on NICE guidance and subsequent developments in the screening programme, for the surveillance of high-risk women. This should be of benefit to those women and should not compromise the delivery of the existing high quality population screening programme. The advisory committee also pointed out that the national programme should not be burdened with a large number of protocols. The working party has worked independently of the national programme.
It is not difficult to acknowledge the need for a more intense screening for a small group of women with a very high risk, but a critical issue is if women with a moderately high risk should be offered a more intense programme. Depending on how the lower limit for moderate high risk is set, such a group may be very large. Furthermore, while some women with moderate high risk can be clearly identified by e.g. a family history, women with epidemiological risk factors entailing a moderately high-risk will be difficult to identify and inform.

The taskforce has modelled the effects of more intensive screening programs given different levels of lifetime risk. Furthermore, the taskforce has commissioned a research group to summarize the evidence for the lifetime risk given accepted epidemiological risk factors and to estimate the prevalence of these.

11.35-12.35 Session 3
Advanced Breast Imaging

3.1 11.35-12.00 - Overview of Molecular Imaging

Speaker: Ferdia Gallagher
CRUK Cambridge Research Institute, UK

An introduction to functional and molecular imaging
Although great advances have been made in the spatial resolution that can be achieved using conventional imaging techniques, this resolution is several orders of magnitude larger than a biological molecule. Furthermore, improving spatial resolution in patients faces a number of fundamental practical challenges such as increasing radiation dose and the time to acquire and interpret images.
Consequently, new techniques are being developed to complement the anatomical information that has been traditionally acquired in radiology; these techniques allow tissue function to be assessed, as well as imaging at the cellular and molecular levels. Some of these molecular techniques are already used routinely in many radiology departments such as [18F]fluorodeoxyglucose, the glucose analogue used in PET. Several functional methods are increasingly being used in patients e.g. diffusion weighted imaging and dynamic contrast enhanced MRI. Finally, there are many novel methods that are currently being used for pre-clinical imaging and these may be used in humans in the future e.g. new PET tracers and optical imaging. Breast radiology is very suitable for molecular imaging, particularly because of the superficial nature of the tissue. This talk will review some of the clinical and pre-clinical techniques that can be used for functional and molecular imaging with an emphasis on novel methods used in breast imaging. Although the translation of these techniques to routine use in radiology departments faces many challenges, it promises to offer powerful tools to aid diagnosis, identify disease heterogeneity, predict outcome, target biopsies and determine treatment response non-invasively.

15.30-16.50 Session 5
Therapy and Survivorship

5.2 15.55-16.20 – Key issues for patients after treatment for breast cancer

Speaker: Emma Pennery
National Charity Breast Cancer Care, UK

People treated for breast cancer can continue to experience multi-dimensional problems, even years after treatment has been completed and as the duration of follow-up shortens, there is a greater potential for these needs to go unmet.Cancer survivorship is a concept that encompasses the multi-dimensional aspects of quality of life and the experiences that follow cancer. It is important that health care professionals do not assume that the individual has no subsequent needs even if their cancer treatment has been successful. Numerous studies exploring the experience of surviving breast cancer report similar recurring themes. These can be broadly categorised into emotional, physical, social, spiritual and informational.
Even when deemed in remission, people continue to face problems arising from the chronic nature of breast cancer. Emotional needs include fear of recurrence and death (living with uncertainty), feelings of injustice and anger, anxiety, depression, altered body image integrity, loss of control and problems with relationships. Information needs are thus likely to persist over time, whilst contact with healthcare professionals may diminish.
Breast cancer will inevitably impact on physical well-being and people commonly experience unresolved physical symptoms, largely arising from treatments. These include pain, fatigue, lymphoedema, impaired fertility and menopausal symptoms. Similarly there may be a significant impact on social functioning, such as ongoing difficulties with family support, concerns for children, financial difficulties, an altered insurance risk status and employment problems.
Strategies for addressing the key issues arising after breast cancer treatment include information about possible long-term effects and support with self-management techniques.

Invited speaker abstracts Tuesday 13 July

09.00-10.30 Session 6
What will be in your breast imaging department in 5 years' time?

6.1 09.00-09.25 - Digital Breast Tomosynthesis: technical aspects

Speaker: Andrew Maidment
Department of Radiology, University of Pennsylvania, Philadelphia, USA

Breast imaging is undergoing a revolution towards quantitative tomographic methods. There is active research and development of both dedicated computed tomography, and digital breast tomosynthesis (DBT) or limited-angle computed tomography. Numerous clinical DBT trials are in progress testing systems from a variety of manufacturers, and two systems are already available for sale in Europe. DBT has been shown to have clear value in increasing the conspicuity of lesions by removing overlaying structures present in mammograms.

We have recently installed our third tomosynthesis prototype - a Hologic Dimensions DBT prototype modified to allow contrast-enhanced (CE) imaging. Both dual-energy and temporal CE-DBT are under investigation. Current research is focused on the development and validation of precise image-derived metrics (image-based biomarkers) with physiologically relevant parameters, including treatment response to interventions and clinical outcomes. We have shown that CE-DBT can provide results concordant with dynamic contrast-enhanced MR in a group of 17 women with known or suspected breast cancer. As such, we believe that CE-DBT has potential in the same roles as MR. These roles include screening high-risk populations, staging cancer patients through identification of multifocal, multicentric and contralateral cancer, and assessment of tumour response to neoadjuvant chemotherapy.

Finally, there is a revolution in radiographic contrast agents. Taking inspiration from nuclear medicine and optical imaging, we are seeing an increase in research into radiographic contrast agents. These developments are made possible given recent advances in nanoparticles such as designer liposomes, polymersomes and nanospheres. Both blood-pool and targeted contrast agents are under investigation.

6.3 09.50-10.15 - Latest developments in Breast CT

Speaker: Willi Kalender
Institute of Medical Physics (IMP), Germany

Full field digital mammography (FFDM) represents today's accepted standard and the most widely applied imaging modality for the early detection of breast cancer. Nevertheless, limitations with respect to its sensitivity and specificity are to be acknowledged. In consequence, many alternative approaches are under investigation at present. The transition from 2-(2D) to 3-dimensional (3D) imaging is one demand, the inclusion of functional in addition to morphologic information is a further one.

X-ray computed tomography (CT) has shown promising results in clinical trials aiming to study contrast medium kinetics, but clinical CT scanners are not recommendable because of insufficient spatial resolution and irradiation of the complete thorax. Dedicated CT scanners with the patient lying prone on the table with only one breast at a time being exposed have been proposed as an additional alternative method for breast imaging. Efforts so far showed success with respect to contrast-enhanced dynamic imaging, but suffered from limited spatial resolution [Lindfors KK, Boone JM et al. Dedicated breast CT: Initial clinical experience. *Radiology* 2008; 246(3): 725–733].

The concept presented in this talk builds upon micro-CT scanning approaches and aims at providing both high spatial resolution at around 100 µm for micro-calcification imaging and advanced dynamic scan capabilities with scan times of about 10 seconds and continuous acquisition for at least one minute for differential diagnosis of lesions. To achieve this, spiral scan modes, slipring technology, high-resolution dose-efficient detectors and high-power micro-focus X-ray tubes are demanded. The concept has been evaluated and confirmed by simulations and basic experiments; first clinical results are expected by the end of 2011.

11.10-12.25 Session 7
The Influence of Imaging on Management

7.1 11.10-11.40 – Evidence for the role of breast MRI from systematic reviews

Speaker: Nehmat Houssami
University of Sydney, Australia

Influence of imaging on breast cancer management: Evidence on MRI from systematic reviews

Pre-operative MRI has been applied in staging the breast in women newly affected by breast cancer because it detects additional disease which is occult on conventional imaging. The incremental detection capability of MRI in this setting has been highlighted in a systematic review (SR) and meta-analysis which reported that MRI detects additional disease in the affected breast in a median 16% of women (based on 19 observational studies)[1], and has a PPV of 66%[1]. SR of the contralateral breast in newly diagnosed invasive cancer (22 observational studies)[2] showed that MRI-detected suspicious findings (TP and FP) were reported in 9.3% of women with an incremental cancer detection

rate of 4.1% and a PPV of 47.9%[2]. SR also provided evidence that MRI's incremental detection in the affected breast changes surgical management from breast conservation[1]: pooled estimates for conversion to mastectomy was 8.1%, and to more extensive surgery (mastectomy or wider resection) 11.3%, in multifocal or multicentric cancer[1] (ie. in women with TP MRI-detection); pooled estimates of conversion to mastectomy due to FP MRI-detection was 1.1% and to more extensive surgery 5.5%[1]. While change in surgery due to FP MRI is clearly not beneficial, the issue under much debate is whether more extensive surgery in women (with TP MRI-detection) who would have, under 'standard care', been treated with breast conservation (or less radical surgery) improves clinical outcomes. A recent RCT[3] has demonstrated that pre-operative MRI does not reduce re-excision surgery; therefore the main controversy at present is whether pre-operative MRI will impact long-term local recurrence rates.

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13.40-14.40 Session 8
Hot Topic: impact of digital mammography on European screening programmes

8.1 13.40-13.55 - FFDM: effects on key screening performance indicators in Ireland.

Speaker: Niamh M Hambly

Irish National Breast Screening Programme, Ireland

Contributing Authors: MM McNicholas, N Phelan, GC Hargaden, A O'Doherty & F Flanagan

Introduction: Clinical trials to date into the use of full field digital mammography (FFDM) for breast cancer screening have shown variable results. FFDM was introduced into the Irish National Breast Screening Programme (INBSP) in January 2005. Following its introduction, we reviewed the effect of FFDM on key screening performance indicators in a population breast screening programme.

Method: 188,823 screening examinations were performed between January 2005 and December 2007, of which 35,204 (18.6%) were performed using FFDM. All films were double read using a five-point malignancy rating scale for probability of cancer (R classification) and patients with positive scores were recalled for further work up. The recall rate, cancer detection rate and positive predictive values (PPV) of FFDM were compared with screen film mammography (SFM).

Results: The cancer detection rate was significantly higher for FFDM - 6.3 per 1000 vs. 5.2 per 1000 for SFM, $p = 0.01$). The cancer detection rate for FFDM was higher for initial and subsequent screening, for invasive cancer and DCIS and across all age groups. The cancer detection rate was significantly higher for cancers presenting as microcalcifications (1.9 per 1000 vs. 1.3 per 1000, $p = 0.01$). The recall rate was significantly higher for FFDM (4.0% vs. 3.1%, $p < 0.001$). There was no significant difference in positive predictive value of recall to assessment (15.7% for FFDM and 16.7% for SFM, $p = 0.38$).

Conclusion: The introduction of FFDM resulted in significantly higher cancer detection and recall rates in women aged 50-64. The positive predictive values were comparable. The results suggest that FFDM can be safely implemented into breast screening programmes and in April 2008 the INBSP became the first national screening centre in Europe to be fully digitised.

8.2 13.55-14.10 - Impact of the introduction of CR and DR in a National screening programme in France.

Speaker: Patrice Heid

ARCADES, Marseille, France

In France, the development of screening was gradual between 1980 and 2004. In 2004, the National Programme achieved complete geographic coverage. This programme invites eight millions women aged 50-74 for a free mammography every two years with double reading. In 2009, the number of women screened was 2.343 million.

The French breast cancer screening programme is non-centralized. 2 700 radiology centres are involved, with a specific training and a minimum number of exams per year.

Quality control of all mammography units is mandatory by law. The French protocol is based on the European Guidelines. All radiology centers (Private or public) involved in diagnosis and/or screening are concerned by the same QC procedures.

Before April 2008, the use of DM was only permitted outside of the screening program, reducing the number of DM installed in France. After April, digital mammography was allowed in the screening program. A lot of centers have moved from SFM to DM.

In 6 months, more than 60% of the x-ray units were digital in France, with a majority of CR systems. All the systems controlled are within the limiting values of European guidelines.

A national evaluation is done every year by Ministry of Health (INVS). All the clinical data are collected, with all the details concerning the detection rate, type of cancers, size… and also the technology used to do the exam (manufacturer name, SFM or DM, CR or DR). The impact of the introduction of CR and DR in the program is under evaluation.

8.3 14.10-14.25 - FFDM: effects on key screening performance indicators in Flanders.

Speaker: Federica Zanca
University Hospitals of the KU Leuven, Belgium

Objective: To evaluate if the screening performance parameters of digital mammography (DM) in a decentralized screening organization were comparable with film-screen mammography (FSM).
Methods: A nationwide screening program was launched in 2001 and since 2005 screening with DM has been allowed. Firstly, the parameters of the three regional screening units (RSUs) that first switched to DM (11,355 women) were compared to the FSM period of the same three RSUs (23,325 women). Secondly, they were compared to the results of the whole central breast unit (CBU).
Results: The recall rate (RR) of the DM group in the initial round was 2.64% (2.40% for FSM (p=0.43)) and in the subsequent round 1.20% (1.58% for FSM (p=0.03)). The cancer detection rate (CDR) was 0.59% for DM and 0.64% for FSM (p=0.56). The percentage of ductal carcinoma in situ was 0.07% for DM and 0.16% for FSM (p=0.02).
The positive predictive value was high in the subsequent rounds (DM 48.00%/FSM 45.93%) and lower in the initial round (DM 24.05%/FSM 24.86%). Compared to the results of the whole CBU, DM showed no significant difference.
Conclusion: DM can be introduced in a decentralized screening organization with a high CDR without increasing the RR.

15.35-16.20 Session 9
Meeting the Challenges in providing breast care in the post credit crunch climate

Speaker: Julietta Patnick CBE BA(Hons) FFPH HonMRCR
Director, NHS Cancer Screening Programmes, Sheffield, UK

The challenges before the screening programme fall into a number of areas. The first of these is a permanent feature of the screening programme over the last 15 years and will continue for the next 15 years. This is one of an ever expanding population of women in the age group due to the post-war baby boom which lasted until the late 1960s. Now we are in the middle of expanding our age range to 47-73 and also of bringing higher risk screening into the programme.
At the same time we must maintain the quality of service we deliver, including all the timeliness standards for results and assessments. A few programmes have completely converted to digital mammography. But many programmes are having to persevere with kit which is reaching the end of its useful life and which is difficult to maintain since there are no longer experienced engineers for analogue equipment and spares are hard to come by. However, quality must not be compromised. Our watchword has always been that if we could not deliver the service to the right quality then it should stop as we might be doing more harm than good.
The financial climate imposes on all of us the need to use our resources carefully. This might mean having to be quite creative and develop service models that are quite different than the ones we have been used to since the service started. None of us can remember a financial situation quite like the one we are now faced with.

Proffered papers Monday 12 July

13.50-14.50 Session 4
Proffered Papers

4.1a 13.50-14.00 Comparison of breast tissue evident on craniocaudal versus mediolateral views: the 1cm rule.

Principal Author: K Burke
Royal Bolton NHS Foundation Trust, UK

Purpose: The aim of this study was to perform an audit to determine whether breast imaging practitioners achieve the ≤1cm rule, in conjunction with meeting the standards required by the NHSBSP for two view mammography. All data collected was compared to current practice and relevant literature, allowing recommendations for improvements to be made.
Literature searches revealed no identical study to this one, but identified two similar studies, both referred only to the amount of pectoral muscle evident on mammograms for mediolateral views.
Method: An audit was considered to be the best option for data collection of breast image practitioner performance. Films were assessed in order to see if the ≤1cm (within 1cm) rule of comparison between breast anatomy seen on craniocaudal and mediolateral views was being achieved in conjunction with relevant image criteria. Only patients who had attended incident rounds on mobile units were selected. Fifty individual patient's sets of previous and new films were measured from one BSU in the North West of England. All breast image practitioners films were randomly selected and were measured over a four week period.
Results: Results from this study identified some key areas:

1. Pectoralis muscle on CC views only evident in 11% of films
2. Correct angle and length of pectoralis muscle evident in 22% of MLO films
3. 31.5% of films met ≤1cm rule
4. IMF missing on 49% of MLO of films

Conclusion: These results highlighted some training issues and the need for standardization of positioning criteria within breast imaging.

4.2a 13.50-14.00 Unexplained Differences in the Management of DCIS; the Sloane Project Experience

Principal Author: K Clements
West Midlands Cancer Intelligence Unit, UK
Contributing Authors: O Kearins, *West Midlands Cancer Intelligence Unit, UK*, G Lawrence, *West Midlands Cancer Intelligence Unit, UK* & H Bishop, *The Sloane Project, UK.*

Relatively little is known about the natural history, invasive potential and optimal treatment of DCIS. Several clinical trials have produced conflicting results. The Sloane Project aims to gain definitive answers regarding these questions.
Since 2003, data on defined tumour characteristics and treatment have been collected. All cases are followed up and the incidence of recurrence, contra-lateral disease, metastases and death are determined.
At January 2010 7,540 cases had been entered. 77 recurrences/ contra-lateral and 113 deaths have been recorded. Worrying variations in pathological assessment and clinical management are apparent. The data indicate varying use of wide local excision (WLE) and mastectomy (71% versus 29%). Axillary management also varies, with nodes being removed in 8% of WLE cases and 75% of mastectomy; range of nodes taken varied from 1 to 27. Differences in the use of adjuvant therapies between units are also apparent.
The variation in the management of non-invasive breast cancers submitted to the Sloane Project informs us that breast cancer professionals in the UK do not agree on the optimal method to treat DCIS. The outcome data collected by the Sloane Project will conclusively define which treatments are optimal for tumours with differing radiological and pathological features.

4.3a 13.50-14.00 Clinical Performance of Digital Mammography Systems in a Breast Screening Program

Principal Author: E Keavey
BreastCheck, Irish National Cancer Screening Service, Ireland
Contributing Authors: N Phelan, AM O'Connell, & F Flanagan, *BreastCheck, Irish National Cancer Screening Service, Ireland.*

Purpose: The aim of this study was to compare the clinical performance of the 3 digital mammography systems in a population based screening program.
Methods: 28 digital mammography systems from three different vendors, GE Healthcare (Buc, France), Hologic (Bedford, MA, USA) and Sectra (Linköping, Sweden) were included in the study. The retrospective analysis included 182,267 screening examinations of women aged between 50 and 65 years over a two year period. All images were double read and assigned a result using a 5-point rating scale to indicate the probability of cancer. Women with a positive result were recalled for further assessment and workup. Key clinical performance indicators including cancer detection rate and rates of recall to assessment were analysed.
Results: No significant difference between mammography systems was observed for the overall cancer detection rate or for the detection of DCIS and invasive cancer in either initial, subsequent or all screening examinations. Significant differences were found in respect of recall rate for initial, subsequent and all screening examinations ($P<0.001$) but these differences were inconsistent between these examination categories.
Conclusions: These results demonstrate comparable cancer

detection performance for the three imaging systems operational in our screening program.

4.1b 14.02-14.12 The Impact of Breast Compression on Mammographic Image Quality: initial findings

Principal Author: C E Mercer
Royal Bolton Hospital NHS Foundation Trust, UK
Contributing Authors: P Hogg, *University of Salford, UK* & J Diffey, *Christie Hospital, UK*

Purpose/Background/Objectives: In mammography it is considered that compression reduces radiation dose and improves image quality. No guidelines exist on how much pressure should be applied for different breast types and volumes, consequently for 'similar patients' there can be variation in imaging practice. This research seeks to establish whether any relationship exists between compression and image quality.

Methods: Ethical approval obtained for 2,000 images. Following parameters recorded: applied pressure; breast type (BIRADS); radiation dose, breast thickness, breast volume. Pilot study assessed operator variability. Inferential statistical tests (ANOVA, Kruskall-Wallis, Spearman's Rank) were applied to data.

Results: Spearman's rank revealed no relationship between breast compression and image quality score in all density categories under these study determinants. ANOVA / Kruskall-Wallis showed that all radiographers do not use the same mean compression value. Strong positive correlations were found between breast volume/breast thickness and breast dose/ breast thickness.

Conclusion: Findings suggest no correlation between breast compression and overall image quality grade; further research is strongly suggested to determine a more robust technique for the assessment of image quality for breast compression analysis. We are currently developing a new psychometric scale for assessing image quality and intend to apply this scale to the same 2,000 images.

4.2b 14.02-14.12 MRI for lobular breast carcinoma; is it likely to be useful?

Principal Author: T Hanna
Derriford Hospital, Plymouth, UK
Contributing Authors: R Watkins & S Andrews, Derriford Hospital, Plymouth, UK.

Introduction: Invasive lobular cancer (ILC) is often multifocal with implications for surgical treatment. MRI more accurately detects multifocality than standard imaging and NICE guidelines recommend MRI for patients considering breast conserving therapy (BCT). Our aim was to determine the potential benefit of MRI.

Methods: Women diagnosed with ILC between 1996 and 2009 who did not have MRI were identified. The preoperative diagnosis and surgical treatment were recorded.

Results: 366 women underwent surgery. 159 (43%) initially received BCT and 207 (57%) mastectomy. Of 159 having BCT, only 94 had a preoperative diagnosis of ILC and would now warrant MRI. Of these 64 had no further surgery. 18 required completion mastectomies, 9 had repeat BCT and 3 needed repeat BCT and completion mastectomy. The maximum theoretical advantage from MRI would be avoidance of 33 repeat operations but at a cost of approx £500 for each patient with ILC eligible for BCT.

Conclusions: Preoperative MRI staging of ILC could potentially reduce repeat operations by 26%. Unless MRI can reduce reoperation rates to below 5% its costs may be difficult to justify.

4.3b 14.02-14.12 Comparing the accuracy of digital breast tomosynthesis with full field digital mammography

Principal Author: R K Wasan
King's College Hospital, UK
Contributing Authors: A. Iqbal, D.R. Evans, C. Peacock, J.C. Morel, A. Douiri, C.P. Lawinski & M.J. Michell, *King's College Hospital, UK*

Purpose: To compare the accuracy of Digital Breast Tomosynthesis (DBT) with 2D Full-Field Digital Mammography (FFDM) in women recalled for mammographic abnormalities found on routine screening.

Methods: Ethics approval for the study was obtained in December 2008. Entry into the study was offered to all women recalled for further assessment of a mammographic abnormality found on routine film-screen mammography. Study participants underwent bilateral 2D FFDM and DBT in the cranio-caudal and medio-lateral oblique projections using the Hologic Dimensions unit. Mammographic features, mammography score using the RCR Breast Group classification 1 to 5, breast parenchymal density and outcome for assessment were recorded. Receiver Operating Characteristic (ROC) analysis was applied.

Results: Results of the first 450 study participants are presented. The participation rate was 91.3% of eligible women. 107 (23.8 %) were diagnosed as malignant (in situ or invasive cancer), 156 (34.6%) as benign and 187 (41.6 %) as normal. ROC analysis demonstrates a significant improvement in diagnostic accuracy of DBT compared to FFDM (0.9649 and 0.9125, respectively; p=0.0001) and the effect is significantly greater for soft tissue lesions compared to microcalcification.

Conclusions: DBT is more accurate compared to 2D FFDM in the assessment of mammographic abnormalities detected on routine film-screen mammography.

4.1c 14.14-14.24 False positive mammographic screening; factors influencing re-attendance

Principal Author: P Fitzpatrick
National Cancer Screening Service, Ireland, University College Dublin, Ireland
Contributing Authors: P Fleming, S O'Neill, D Kiernan & T Mooney, *National Cancer Screening Service, Ireland.*

International studies on the effect of false positive mammographic screening on subsequent re-attendance at screening are inconsistent. The aim of this research was to quantify the impact of false positive mammography (by age group, assessment procedure and initial or subsequent screening) on subsequent re-attendance in BreastCheck, the national breast screening programme for the Republic of Ireland, which screens women two-yearly. Re-attendance for subsequent screening is approximately 90%.

From programme commencement in 2000 to the end of 2007, 13,352 screening tests resulted in assessment; 10,632 were aged 50-62 years and of these 9,746 were false positive. Following a false positive recall to assessment, re-attendance at subsequent screening differed significantly by procedure type (open biopsy 80.3%; core biopsy only 90.2%; no tissue sampling 91.4 %; $p<0.0001$) Re-attendance differed significantly by timing of false positive assessment in a woman's screening history (first vs subsequent screening 89.5% vs 93.5% $p<0.0001$). Age group did not have a significant impact on re-attendance (50-54: 90.9%; 55-59: 90.4%; 60-62: 90.4%). After logistic regression, first screening, older age and open surgical biopsy were significant negative predictors of re-attendance.

BreastCheck is now fully digital since April 2008, with a resulting increase in recalls; re-attendance will be closely monitored.

4.2c 14.14-14.24 Can we extend the role of large volume biopsy in B3 lesions

Principal Author: Sabrina Rajan

The Leeds Teaching Hospital NHS Trust, UK

Contributing Authors: M.E Fletcher & B.J.G Dall, *The Leeds Teaching Hospital NHS Trust, UK.*

Large volume biopsy has been introduced into clinical practise to increase the pre-operative diagnosis of breast cancer and reduce the benign surgical biopsy rate.

It has done this in selected cases but the increasing number of B3 biopsies have reduced the effectiveness of it. In accordance with previous local audit all our B3 biopsies with atypia were sent for surgical diagnostic biopsy.

In April 2009 our unit after MDT discussion developed a protocol which advised mammotome biopsy of all B3. The cases were individually discussed at MDT post mammotome biopsy and in accordance with our protocol

1. discharged if mammotome biopsy benign + contans core biopsy track
2. surgical therapeutic procedure if upgraded to B5
3. 5 year annual followup through the symptomatic service rather than diagnostic biopsy to be arranged if atypia only on mammotome biopsy + mammographic lesion removed or adequately sampled
4. diagnostic biopsy reserved for cases where mammotome reveals more severe atypia or imaging abnormality more extensive

April 2009 - Feb 2010 45 mammotomes were performed for B3. 29 remained B3, of which only 5 had a diagnostic biopsy. This change in policy has reduced our benign surgical biopsy rate and still allows safe management of our patients.

4.3c 14.14-14.24 Photon Counting Spectral Imaging optimization of subtraction

Principal Author: E Moa

Sectra Mamea AB, Solna, Sweden

Contributing Authors: F Diekmann, *Charité Universitätsmedizin Berlin, Germany*, M Danielsson, *Royal Institute of Technology, Stockholm, Sweden*, M Hemmendorff, B Svensson & M Åslund, *Sectra Mamea AB, Solna, Sweden.*

Photon counting spectral imaging enables material decomposition which allows for distinction between e.g. glandular tissue and iodine, and may distinguish between lesions such as cysts and tumors. With a contrast agent it could be an alternative to MRI, and without contrast agent it may increase sensitivity.

Using clinical spectral tomosynthesis images with and without iodine the weighting factor for subtraction was optimized. The clinical images were assessed by one radiologist and compared to 2D mammography and MRI. The subtraction was also evaluated in 2D using an anthropomorphic breast phantom with simulated non-enhanced lesions.

Five 5 cm slabs of breast equivalent material (0%-100% glandular fraction) were imaged with simulated embedded tumours. The contrast-to-noise ratio was measured relative the 100% material to evaluate cancellation of anatomic structures and maintenance of target signal.

The radiologist found the iodine enhancements in the clinical images well depicted. A polynomial weighting was found to be optimal for reducing anatomical noise. The simulated lesions were well visible in subtracted images where the anatomical noise was reduced from 40% contrast to 8%.

Contrast enhanced spectral imaging has the potential to become a complement to breast MRI. It may add sensitivity in screening without contrast agent.

4.1d 14.26-14.36 Screen-detected breast cancer " how does round skipping effect key outcome predictors?

Principal Author: P Fitzpatrick

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Contributing Authors: T Mooney, A Duignan & D Kiernan, *National Cancer Screening Service, Ireland.*

BreastCheck screens women throughout Republic of Ireland; uptake rates exceed 70%. In addition to those women who fail to attend ever, there is a group of women who skip rounds, either one or several and then return to the screening programme, defined as 'Previous-non-attenders (PNAs)'. The aim was to compare the screening process and key outcome predictors of cancers detected in PNAs and regular attenders between Programme start in 2000 and December 2009.

Of 76,420 PNAs invited, 19,427 (25.4%) attended for screening, with 200 cancers detected, 145 (84.2% invasive) at first and 55 (80.4% invasive) at subsequent screening. Recall rates were

higher among PNAs in both first (6.6% vs 5.7%; p=0.0001) and subsequent (3.4% vs 2.3% p=0.0001) screening. The percentage true-positive recalls was higher in PNAs at first (16.6% vs 13.5%; p=0.01) and subsequent screening (27.6% vs 22.1%; p=0.07). Among regular attenders the proportion of invasive cancers <=10cm and <15cm was non-significantly higher; invasive cancer size was greater in PNAs at all age groups and significantly in those aged 55-59.

Cancers in those women who skip screening rounds demonstrate the effects of delays in diagnosis, with higher recall rates, higher true positive rate, and trend towards larger, higher grade tumours.

4.2d 14.26-14.36 Second look axillary ultrasound study.

Principal Author: M A McMahon

Nottingham Breast Institute, UK

Contributing Authors: E.J. Cornford, H Burrell, J.J. James, L.J. Hamilton, A Lee, D Macmillan & A.J. Evans, *University of Dundee, Scotland*

Purpose: To improve the pre-operative diagnosis of axillary metastases thereby facilitating axillary clearance.

Methods: 121 consecutive patients with suspicious clinical or radiological breast features (excluding DCIS) had an axillary ultrasound (US) as is our usual practice. Morphologically abnormal nodes were sampled using US guided core biopsy.

Following multidisciplinary team discussion patients deemed to be of high risk of axillary metastases (according to set criteria) were considered for second look US if axillary involvement had not been confirmed at first look procedure. At second look US abnormal nodes were biopsied otherwise a morphologically normal appearing node was sampled.

Results: 32% of patients were node positive at surgery (39/121).

At first look US (n=121) 39 patients had axillary biopsies, of these 25 had a positive biopsy giving a first look pre-operative diagnostic rate of 25/39 (64%).

At second look US (n=21) 18 patients were biopsied, of these 4 patients had a positive biopsy increasing our overall pre-operative diagnostic rate to 29/39 (74%).

Of the 4 positive biopsies 2 of the nodes appeared normal on US.

Conclusion: 2nd look ultrasound biopsy increased our overall pre-operative diagnosis from 64% to 74%.

Should current practice be modified to perform axillary US biopsies on any patient with high risk features?

4.3d 14.26-14.36 Comparison of B-mode ultrasound, AFUSON and histopathology sizing in early breast cancer.

Principal Author: R E English

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Contributing Authors: J Li, Y Chi & JA Noble, *Department of Engineering Science, University of Oxford, UK*, A Parker, D Roskell, RF Adams & V Parulekar, *Oxford Breast Imaging Centre, Oxford Radcliffe Hospitals NHS Trust, UK*, J Baldwin, Oxford Breast Imaging Centre, *Oxford Radcliffe Hospitals NHS Trust, UK.*

Purpose: Preoperative breast cancer sizing is required for surgical planning. Breast ultrasound is widely used but may not be accurate. Assisted freehand ultrasound of the breast (AFUSON) is a novel method of ultrasound sizing, combining semi-automated elasticity ultrasound with B-mode imaging. This pilot study investigates whether AFUSON sizing corresponds better with the wide local excision histopathology tumour dimensions than with B-mode alone.

Methods: Twenty three patients with early breast cancer were recruited with ethical approval through the NHSBSP. B-mode ultrasound and AFUSON images were acquired in predefined planes. Pathology slices were taken in the corresponding longitudinal plane and digitally scanned. Assessment of tumour dimensions, area and contour were made on B-mode, AFUSON and histopathology scans. The findings were correlated.

Results: The tumour dimension accuracy increased from 66% (B-mode alone) to 82% (AFUSON). Tumour area accuracy increased from 60.7% (B-mode alone) to 89.8% (AFUSON). Some AFUSON images showed high visual shape correlation with histopathology scans.

Conclusion: This pilot study suggests that AFUSON may be useful in early breast cancer sizing. A full study will be done in 2010.

4.1e 14.38-14.48 Using two radiographers to double read mammograms: an observational study

Principal Author: R L Bennett

Cancer Screening Evaluation Unit, Institute of Cancer Research, UK

Contributing Authors: SJ Sellars, *NHS Cancer Screening Programmes, UK*, RG Blanks & SM Moss, *Cancer Screening Evaluation Unit, Institute of Cancer Research, UK.*

Most mammograms in the NHSBSP are double read; often by a radiologist and a film reading radiographer. Increases in workload and a shortage of radiologists led to a proportion of mammograms being double read by two radiographers in some units.

An observational study was initiated in 2004 to investigate the effect of this change in practise (non-discordant radiographer only reading - NDROR), on overall unit performance.

13 units were identified as pilot sites, and 51 units as control sites. During the period 2006-2009, between 15% and 48% of mammograms were by NDROR in seven of the pilot sites. In 2009, between 4% and 77% of mammograms were read by NDROR in six further pilot sites.

After allowing for changes over time in the control sites, there was an increase in recall rates of between 7% and 11% in the pilot sites following the introduction of NDROR. There was no evidence of a difference in cancer detection rates. The results suggest that NDROR is not likely to have a major impact on programme performance if it is closely monitored, particularly recall rates.

4.2e 14.38-14.48 Diffusion Weighted Imaging and Breast MRI: Assessment of Response to Neoadjuvant Chemotherapy

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Contributing Authors: R Perera, AF Jones, S McWilliams & G Charles-Edwards, *Guys and St Thomas' Hospitals NHS Foundation Trust, UK.*

Purpose: To compare apparent diffusion coefficient (ADC) values with tumour size and enhancement characteristics on breast MRI in patients receiving neoadjuvant chemotherapy (NACT) for breast cancer.

Method: We retrospectively reviewed ADC values of breast cancers in 23 women receiving NACT from October 2008 to January 2010. We compared ADC values of tumours pre-treatment, mid-treatment (3-4 cycles at 3 months) and post-treatment (6-8 cycles at 6 months) with tumour size and enhancement characteristics on MRI.

Results: 17/23 patients showed a good response to treatment, 6/23 patients did not. In 48% (n=11; 9 responders), the post-treatment ADC value > mid-treatment ADC > pre-treatment ADC. In 39% (n=9; 5 responders) the post-treatment ADC value < mid treatment ADC > pre-treatment ADC. No mid or post-treatment ADC values were measurable in 13% (n=3) because the tumour had shown a complete response.

Conclusions: Increasing ADC values correlated well with treatment response assessed by tumour size and enhancement curves. Of the responders, 82% showed the greatest increase in ADC values on the mid-treatment MRI - a finding not seen in any of the non-responders. This supports the growing evidence for ADC values as an early indicator of response to NACT in breast cancer patients [1,2].

References

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4.3e 14.38-14.48 Assessment of the value of ShearWave™ Elastography in characterizing breast lesions

Principal Author: D O Cosgrove

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Contributing Authors: C Doré, *United Kingdom & BE1 Co-investigators, BE1 Collaborative Group, International.*

Purpose: We report on updated interim results from an ongoing prospective multi-centre international study to evaluate the impact of adding ShearWave™ Elastography (SWE) features to the BI-RADS® classification in the framework of breast cancer diagnosis.

Methods: A subset of 192 female breast lesions (42.71% malignant) was analysed. Reproducibility of SWE images and measurements was assessed; logistic regression analysis was performed to predict the pathology findings. SWE features were added to the ultrasound BIRADS to generate models that were challenged by comparing ROC curves, sensitivity and specificity scores.

At the time of submission, the first phase recruitment is complete and the best characterization model is being defined on 1,000 lesions.

Results: In the preliminary analysis, intraoperator reproducibility of SWE size (IOR>0.93) and mean elasticity (IOR=0.88) measurements were very good. Using the best three-variable model (BIRADS + elasticity shape + maximum elasticity), the ROC area increased from 0.773 to 0.934, specificity increased from 61.8% to 87.3%, although sensitivity decreased from 92.7% to 87.8%.

Conclusion: In this ongoing study, SWE provided reproducible information (elasticity values and SWE map) that improved the ultrasound characterization of breast lesions. These features are directly linked to the characteristics of SWE: local quantification and millimetre resolution. These initial results are undergoing extended analysis.

Poster abstracts

Primary Research Abstracts (PR-P)

PR-P1 How effectively do Breast Screening Units communicate with South Asian women?

Principal Author: A K Jain
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Contributing Authors: N. Acik-Toprak & J. Nazroo, *University of Manchester, UK*, J. Serevitch, *The Nightingale Centre & Genesis Prevention Centre, University Hospital of South Manchester, UK.*

Background: South Asian women are known to have relatively low levels of breast screening uptake. The aim of this study is to examine the actual provision of services, how this might vary at the national level and how the provision of services might account for these inequalities.
Methods: Semi-structured questionnaires were sent by AJ in 2009 to all the 99 BSUs (66% response rate) in the UK to assess current practices as well as share good experiences.
Results: 80% of the BSUs recognise that recording patients' language would improve their services, yet only 18% actually do so. Moreover, although 84% of BSU have leaflets in South Asian languages, only 27% of them actually hand out the leaflets. Finally, only 30% of the BSU have Link/Promotion Officers, while only one unit had received separate funding to target South Asian women.
Conclusions: Overall the results suggest that there are limited resources to improve the screening uptake rates of South Asian women. Moreover, despite the availability of translated material the majority of BSUs are still not communicating well with them. Thus, there is failure to provide even this basic provision for South Asian women with few examples of attempts to go beyond this.

PR-P2 Evaluation of Sectra Diagnostic Scan for Contact-Spot Imaging

Principal Author: G Egan
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Contributing Authors: N Phelan & P Baldelli, *Breastcheck, NCSS, Ireland.*

This study evaluates the image quality performance of Diagnostic Scan (DS) on the Sectra MDM mammography system compared to full-field contact imaging and geometric magnification methods available on Hologic and GE systems.
Geometric magnification is typically used for further assessment of suspicious screen detected lesions. The DS functionality utilises a contact spot imaging method which reduces the width of the scan to half of the full-field combined with increased radiation exposure.
Contrast to Noise Ratio (CNR) and Average Glandular Dose (AGD) were measured according to the EUREF guidelines. Breast equivalent phantoms were used to subjectively compare the performance of the systems in full-field and spot-magnification mode by scoring the visibility of simulated microcalcifications and measuring line-pair resolution.
The Diagnostic Scan yields a similar AGD compared to full field contact imaging on the Sectra and is significantly lower than the AGD for conventional geometric magnification imaging on other systems. The Sectra DS also demonstrated generally similar imaging performance with marginally higher calcification visibility compared to alternative geometric magnification techniques.
The results demonstrate that the DS system is comparable to other imaging methods conventionally used for assessment of microcalcifications and offers workflow advantages.

PR-P3 Use of digital breast tomosynthesis in the assessment of mammography detected abnormalities

Principal Author: M J Michell
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Contributing Authors: R.K. Wasan, A. Iqbal, D.R. Evans, C. Peacock, J.C. Morel, S. Dyson, V. Phillips & V. Milnes, *King's College Hospital, UK.*

Purpose: To illustrate the use of Digital Breast Tomosynthesis (DBT) in the further assessment, workup and management of women with mammographic abnormalities.
Methods: DBT has been offered to women attending for further assessment of abnormalities detected on film-screen mammography from January 2009 at King's College Hospital. Over 700 participants have been recruited in the trial approved by the local ethics committee. Mammographic signs were recorded and suspicion was scored according to the Royal College of Radiologists (RCR) Breast Group classification. The final pathological outcome was also documented. The DBT examinations have been obtained using a Hologic Dimensions unit.
Results: DBT has been found to provide additional diagnostic information which allows greater accuracy in the interpretation of mammographic features of abnormalities in women with screen detected lesions. The technique has been found to be of most value in the further analysis of soft tissue lesions. DBT has also been found to be helpful in predicting the extent of tumour.
Conclusions: This educational poster will illustrate the value of DBT in assessment of mammographic abnormalities. The exhibit will provide the opportunity to compare 2D digital images with corresponding DBT images for characterisation of various lesion types with pathology.

PR-P4 Should breast screening invitation for older women cease?

Principal Author: J Gallagher
The Nightingale Centre, UK
Contributing Authors: D Seddon & J Dodgeon, *University of Salford, UK*

Purpose: To examine the effect of the Cancer Plan (2000) on attendance and cancer detection within a cohort of women born in 1933.

Background: The Cancer Plan (2000) extended the age of screening invitation to include women up to age 70; women born in 1933 previously ceased from routine invitation were re-invited.

Objectives: To analyse data from breast screening statistics; evaluate current uptake and screening outcome; use evidence gained to evaluate policy change.

Methods: Empirical research using quantitative methods and a positivist approach; data collection; descriptive statistical analysis.

A sample of 1,000 women was drawn from a population of 7259 women born in 1933 with full screening history; this provided a confidence level of 99% and 4% margin of error.

The project used data in the public domain; ethical approval was not required.

Results: Prior to the inception of the 2000 Cancer Plan, 29.7% self referred (without invitation).

After the introduction of the Cancer Plan, 56.2% women attended.

There was no significant increase in cancer detection rate.

Conclusions: Invitation improves attendance somewhat.

The cancer detection rate in this study does not support further change in current policy.

PR-P5 Current knowledge, attitudes and practices on breast cancer and mammography in Uganda

Principal Author: E K M Kiguli-Malwadde

Makerere University, Uganda

Contributing Authors: R Mubuuke & M G Kawooya, *Makerere University, Uganda.*

Introduction: Breast cancer is the third commonest cancer in Ugandan women. However, women present late for management which leads to high mortality rates.

Objective: To assess the knowledge, practices and attitudes of Ugandan women concerning breast cancer and mammography.

Methodology: A descriptive cross-sectional study where 100 women reporting were interviewed. We used consecutive sampling. Interviewer-administered questionnaires were used to collect opinions of the participants. For data analysis, answers were described as knowledge, attitude, practice and they were correlated with control variables through the chi-square. Bivariate and logistic regression analyses were also used.

Results: 71% of the women had no idea about mammography. More than 50% did not know about risk factors for breast cancer. The attitude towards mammography was generally negative since most women thought it was dangerous. Regarding seeking for mammography; level of literacy, occupation and marital status were significant on bivariate analysis, however only level of literacy and employment remained the significant independent variables on logistic regression analysis. The main barrier to mammography was mainly lack of information.

Conclusion: Women in this study did not have adequate knowledge on mammography and breast cancer. Their attitude towards mammography was negative and most had not had a mammogram.

PR-P6 The effects of image manipulation on digital mammographic interpretation

Principal Author: Y Chen

Loughbrough University, UK

Contributing Authors: A Evans & J James, *Nottingham Breast Institute, UK*, A Turnbull, *Breast Unit, Derby Royal Hospital, UK.*

Purpose: To examine how image manipulation affects the examination of digital breast screening cases.

Method: Fourteen radiologists and advanced practitioners examined 40 difficult FFDM two-view screening cases on a digital mammography workstation. The cases represented malignant, normal and benign appearances with masses, calcifications and architectural distortions. Each participant examined 20 cases using image manipulation tools and another 20 cases not using image manipulation. For each case they indicated whether an abnormality was present, specifying its location and classified the case if abnormal.

Results: JAFROC analysis showed that the Figure-Of-Merit with and without using image manipulation was 0.816 and 0.838 respectively. ANOVA elicited that there was little difference in performance whether or not image manipulation was used. Surprisingly, performance not using manipulation was slightly better ($p>.05$); although using manipulation significantly ($p<.05$) increased the case examination times. There was no difference between the two conditions for identifying key features except for calcifications which was significant ($p<.05$) - with manipulation use increasing the number identified as well as increasing the false positive decisions.

Conclusions: Image manipulation is not required to interpret FFDM images adequately, whilst it improves calcification detection this is at the cost of potentially increased recalls.

PR-P7 B3 core biopsy: Is the rate of malignancy related to screening round?

Principal Author: R J Hunt

Derriford Hospital, UK

Contributing Authors: J.R. Steel, G. Porter, C. Holgate & R.M. Watkins, *Derriford Hospital, UK.*

Purpose: B3 (suspicious, probably benign) core biopsy results for screen-detected lesions can prove difficult to manage as malignancy is found in one third of cases at open biopsy. We aimed to determine the rate of malignancy at open biopsy in lesions where a pre-operative B3 result had been obtained and determine whether this rate varied according to the type of screening round.

Methods: All women who had NHS Breast Screening and subsequent B3 core biopsy from 01/01/1999 to 01/01/2010 were reviewed.

Results: Of 188 women who had their lesion excised, malignancy was present in 53 (28%). 74% of all cancers were DCIS or LCIS. 67 women were in the prevalent round of which 12 (18%) had malignancy compared with 41 (34%) malignant diagnoses in 121 women in the incident round. (Fisher's exact test, p= 0.014). The mean ages in the prevalent and incident rounds were 50.6 and 61.5 years respectively.

Conclusion: A significant rate of malignancy, especially non-invasive disease, is seen in women who have an indeterminate core biopsy and undergo open biopsy. Differential rates of malignancy according to the type of screening round may help in managing women with B3 core biopsy results.

PR-P8 Radiographers' education: Does it make a difference?

Principal Author: V Parulekar

Oxford Breast Imaging Centre, Churchill Hospital, Oxford, UK

Background: Women with normal screening mammograms are recalled for assessment due to breast symptom noted by radiographer or patient. Aim was to assess which symptoms needed assessment.

Method: Retrospective audit of women with normal screening mammograms recalled for symptoms was performed in 2007. Symptoms were categorised and matched with assessment findings and outcomes. It was noted if symptom was highlighted by radiographer/patient. 65% of recalls were due to inappropriate clinical details by radiographers for nonspecific symptoms of lumpiness, itchy nipple, rash and pain. No malignancy was detected. Radiographers were educated in breast signs and symptoms by breast care nurses. Follow up audit was performed in 2008.

Results:

- 65% of recalls were unnecessary in 2007. This reduced to 43% in 2008.
- 3 invasive carcinomas were detected in 2008 compared to none in 2007.
- Lump in breast had positive assessment in 2007 (62%) and 2008 (66%), 3 were invasive carcinomas, making it significant symptom.
- There was no discordance between Radiographers' and Radiologists' clinical findings on assessment in 2008.

Conclusion: Radiographers' education in breast clinical signs and symptoms is of immense importance. It significantly contributes to reduction in recall to assessment.

PR-P9 A retrospective review of incident round cancers. Are there any training issues?

Principal Author: J M Butt

Kingston University, England, UK

Research was undertaken to evaluate the sensitivity and specificity of film readers, to understand why features of cancer might be missed or misinterpreted, and to make any recommendations for training or change of practice.

Following ethics approval 108 cases of screen detected breast cancer were randomised 1:1 with control cases. Films were retrospectively blind-reviewed by film readers. From the data obtained, values for true negative, true positive, false negative, and false positive were determined to assess the individual sensitivity and specificity of the film readers.

Values for specificity were similar for all readers with greater variations in sensitivity. Retrospectively 28/108 breast cancers (26.67%) were visible at the round prior to diagnosis. 24/28 were correctly identified; 4/28 had misinterpreted features. Mass was the most common potentially visible feature (9/24). 3/108 had been assessed for the feature which developed into breast cancer. In two cases the area had not been visualised adequately on magnification films due to poor radiographic technique.

The most common missed feature is mass. Film readers should be aware of this when reading. Strengths and weaknesses of individual readers could be used positively as an in-house learning tool. Further radiographer training in magnification techniques may be required.

PR-P10 Breast implants: Routine screening with Mammography and Ultrasound?

Principal Author: M S Stahnke

Southampton University Hospital, UK

The Southampton and Salisbury breast screening unit screens more than 20,000 women per annum. Patients with implants are routinely screened with mammography and ultrasound. Increased pressure on the services prompted a review.

A retrospective study of all patients undergoing both imaging modalities was undertaken over a period of 3 years looking at whether mammography combined with US was more sensitive than mammography alone.

The average age of the women screened was 57. The total number of women with implants invited for screening was 112 in 2007, 256 in 2008 and 270 in 2009. The number of women screened was 75 in 2007, 163 in 2008 and 158 in 2009. Of all the women screened only 2 women were found to have a serious pathology. Both of them had abnormal mammograms. Ultrasound did not detect any pathology not seen by mammography.

This study shows that the routine use of ultrasound as an adjunct to mammography in women with breast implants is not justified.

PR-P11 Effect of mammographic background pattern on MRI evaluation of invasive lobular carcinoma(ILC)

Principal Author: H N Purushothaman

The Royal Marsden Hospital, UK

Contributing Authors: AR Wilson & SD Allen, *The Royal Marsden Hospital, United Kingdom*

Aim: Does mammographic density affect assessment of ILC with MRI.

Method: Retrospective study. 24 patients with ILC were

reviewed, including their clinical assessment, surgical pathways and histopathology. Mammographic breast density was scored using the Bi-RADS categories.

Results: 27 ILCs were identified in 24 women. 42% of mammograms were classified as Bi-RADS 3, 42% Bi-RADS 2, 16% Bi-RADS 1. Of those classified as Bi-RADS 3, mammography did not detect tumour in 60%; tumour extent was underestimated in 20% and correctly estimated in 20%. With MRI 15% of tumours were not detected, tumour size was underestimated in 21%, overestimated in 7% and correctly assessed in 57%. Those classified Bi-RADS 2, 20% were not detected on mammography, 40% were overestimated, 20% underestimated and 20% correctly assessed. 80% were correctly assessed on MRI. Those classified as Bi-RADS 1, mammography overestimated size in 100%, MRI underestimated size in 50% and correctly assessed size in 50%. 12 women underwent mastectomy. In 12 that underwent wide local excision 3 had positive margins.

Conclusion: MRI is more sensitive than mammography in detecting ILC, particularly in women with dense breasts. Mammography overestimates ILC size in fatty breasts. Quantitative assessment MRI background pattern for these parameters will also be presented.

PR-P12 Using two radiographers to double read mammograms: an observational study

Principal Author: R L Bennett

Cancer Screening Evaluation Unit, Institute of Cancer Research, UK

Contributing Authors: SJ Sellars, *NHS Cancer Screening Programmes, UK*, RG Blanks & SM Moss, *Cancer Screening Evaluation Unit, Institute of Cancer Research, UK.*

Most mammograms in the NHSBSP are double read; often by a radiologist and a film reading radiographer. Increases in workload and a shortage of radiologists led to a proportion of mammograms being double read by two radiographers in some units.

An observational study was initiated in 2004 to investigate the effect of this change in practise (non-discordant radiographer only reading - NDROR), on overall unit performance.

13 units were identified as pilot sites, and 51 units as control sites. During the period 2006-2009, between 15% and 48% of mammograms were by NDROR in seven of the pilot sites. In 2009, between 4% and 77% of mammograms were read by NDROR in six further pilot sites.

After allowing for changes over time in the control sites, there was an increase in recall rates of between 7% and 11% in the pilot sites following the introduction of NDROR. There was no evidence of a difference in cancer detection rates. The results suggest that NDROR is not likely to have a major impact on programme performance if it is closely monitored, particularly recall rates.

POSTERS

Audit Poster Abstracts (A-P)

A-P1 Audit tools for Clinical Nurse Specialists

Principal Author: J Chapman

West Midlands Cancer Intelligence Unit, UK

Workload analysis and patient satisfaction audit tools have been developed to assess the role of the Clinical Nurse Specialist (CNS) in breast screening services within the West Midlands.

The workload analysis tool gives basic statistics regarding patient throughput and interactions with a CNS. The patient satisfaction tool determines a woman's satisfaction with the CNS service.

During 2006-2008, 79.4% of women had contact with a CNS. Three nursing teams saw significantly fewer women than the regional average; a detailed analysis was carried out with these nursing teams and recommendations for changes made.

In the patient satisfaction survey, 83.2% of women who rated themselves as very anxious on arrival at the assessment clinic had contact with a CNS. This demonstrates that CNSs are targeting their services to those most in need. The survey also gained the views of women on the environment, and on the information and support provided.

The audits have identified where practices in screening services differ; where there are potential problem areas and where there are areas of good practice to be shared across the region. The results have been used successfully to identify and correct gaps in service provision.

A-P2 53: Interval Cancer Review Days as a West Midlands Educational Tool

Principal Author: N Rogers

West Midlands Cancer Intelligence Unit, UK

Contributing Authors: E O'Sullivan & O Kearins, *West Midlands Cancer Intelligence Unit, UK.*

The process for reviewing interval cancers is outlined in national guidance. Each case should be reviewed locally through a multi-disciplinary team meeting and given an appropriate radiological classification of Normal/Benign, Uncertain or Suspicious.

The Quality Assurance Reference Centre holds three sessions a year, where the eight regional units are invited to send a film reader, along with up to 15 interval cancer cases. Each case is read independently by three reviewers and the majority classification accepted. Cases without agreement are reviewed by the group and consensus decision reached. Results from the workshop are then sent to the service.

In the last five years (2005-2009), 1,243 cases have been brought to these sessions. 77% were classified as normal/benign, 10% as uncertain and 12% as suspicious. 1% was unclassifiable. Of the 148 cases which were regionally classified as suspicious, 42% were also locally classified as suspicious: just over a third (34%) were locally reviewed as normal/benign. 8% of cases brought required group discussion: 52% were classified normal/benign, 23% uncertain and 18% suspicious.

These sessions are a useful forum to discuss best practice, as well as highlighting potential differences between local reviewing practices.

A-P3 Monitoring Technical Recall/Technical Repeat (TCTP) Rates Across West Midlands Breast Screening Services

Principal Author: M Glover

West Midlands Cancer Intelligence Unit, UK

Contributing Authors: E O'Sullivan & O Kearins, *West Midlands Cancer Intelligence Unit, UK.*

The West Midlands QA Reference Centre monitors TCTP rates on a quarterly basis.

For the period 2008/09 when 176,001 women were screened, the TCTP rate for the West Midlands was 2.6%. 4,777 women were either recalled for another appointment (Technical Recall, TC) or were required to have another screen on the day of their appointment (Technical Repeat, TP). The majority (56.2%) of women were recalled for another appointment.

Across the West Midlands there was variation between mammographers; with trainee assistant practitioners recording a higher TCTP rate of 8.4% than qualified mammographers (2.5%).

The majority (78.5%) of the TC/TPs across the region were due to operator error. The proportion attributed to problems with the equipment (21.5%) is likely to rise due to issues with failing processors. The main reason for a TC/TP was due to inadequate positioning by radiographers (44.8%).

Services that have implemented digital units have recorded higher TCTP rates and direct action has been required to address these performance data.

As TCTP rate is one of the parameters on which a screening service's eligibility for age expansion is now based, services have been issued with a regional tool, with which they can monitor individual mammographer TCTP rates.

A-P4 Role of gelmark placement at stereotactic breast biopsy and subsequent wire localisation

Principal Author: M A McMahon

Nottingham Breast Institution, UK

Contributing Authors: H Burrell, E.J. Cornford, J.J. James & L.J. Hamilton, *Nottingham Breast Institution, UK*

Purpose: Does the insertion of a gel mark at stereotactic breast biopsy allow subsequent localization to be carried out using ultrasound guidance?

Methods: Review of 100 consecutive patients who underwent a stereotactic vacuum assisted or core biopsy of the breast with gel mark placement, followed by wire localization and surgical excision. Presence and position of the gel mark relative to the abnormality and lesion excision were assessed.

Results: Calcification was the main abnormality (77%). There were 81 vacuum assisted biopsies and 19 core biopsies. 96 patients had a gel mark deployed at the time of the procedure, while 4 gel marks did not deploy. The metallic clip was not visible on check mammograms in 16 cases, but the gel mark was identified on ultrasound in 2 of these. In 83 cases the mammographic lesion, gel mark, biopsy cavity or haematoma were visible on ultrasound and ultrasound was used to guide wire placement. Stereotactic guidance was required in 17 cases (in 9 of these an initial ultrasound guided attempt was unsuccessful). In all cases the lesion was excised at the first surgical operation.

Conclusion: Gel mark placement at stereotactic biopsy allows subsequent localization with ultrasound guidance in the majority of cases.

A-P5 First Reader Film Reader Performance in the NHSBSP

Principal Author: E O'Sullivan

West Midlands Cancer Intelligence Unit, UK

Contributing Authors: O Kearins & M Glover, *West Midlands Cancer Intelligence Unit, UK.*

The Film Reading QA standard report records each film reader's recommended actions (e.g. routine recall) and the final episode outcome for the woman (e.g. cancer diagnosis). From these, first reader Positive Predictive Value (PPV) and Cancer Miss Rates (cases that first reader recommended routine recall, recalled to assessment by a subsequent reader and a cancer diagnosed) can be calculated.

In 2005-08, 527,913 women were screened in the West Midlands; the recall rate was 4%, the cancer detection rate was 7.8 per 1,000 women screened and the PPV was 19.5%. At service level, PPV varied from 14.9% to 29.2%. Three services had a significantly lower PPV at first read and two were significantly higher.

Cancer Miss Rates varied from 0.2 to 0.7 per 1,000 women screened, with a regional average of 0.5. These differences were not significant at unit level.

Individual reader PPV varied from 7.8% to 48.4% and Miss Rates from 0 to 2.0. There was no difference in performance between film reading radiographers and radiologists.

Monitoring individual performance is important as digital mammography is introduced, with the inevitable learning curve and period of adjustment. Comparing analogue and digital outcomes will help to identify training needs.

A-P6 Arbitration for concordantly abnormal screening mammograms - perceptions and reality

Principal Author: R Patel

York Hospital, UK, Leeds & West Yorkshire Radiology Academy, UK

Contributing Authors: A Murphy, *York Hospital, UK*

Background: Since the introduction of 'direct entry' our institution has changed practice from arbitration for all abnormal screening mammograms, both concordant and discordant, to arbitration only for those where double reading is discordant.

Aims:

- Determine the effect of "direct entry with automatic recall if unanimous" on benign pathology recalled
- Examine whether implementing this change affected

reporting practice and the perceptions towards this

Methods:

- Retrospective review of two 6-month periods before and following 'direct entry'.
- Confidential on-line survey of local readers' (n=6) reporting practice and perceptions of 'direct entry'.

Results:

	July – Dec 2007 (before 'direct entry')	**July – Dec 2008 (following 'direct entry')**
Patients recalled (%)	4.0	4.3
Recalled and discharged without biopsy/ FNA i.e. benign recall (%)	41.5	48.1
Benign biopsy/ FNA (%)	58.8	61.2
Overall cancer rate (%)	0.92	0.85

- 'Direct entry' altered the reporting practice of two thirds of reporters.
- 80% of reporters perceived direct entry to increase benign pathology investigated.

Conclusion: Implementation of 'direct entry' affected reporting practice and there has been an increase in benign pathology recalled. The unit needs to review its policy in light of this audit.

A-P7 B3 open excision biopsy - the end of the road?

Principal Author: E Rowbotham

York Hospital, UK

Contributing Authors: K Ellingham, *York Hospital, UK*

B3 lesions - including radial scars, papillary lesions, atypical intraductal epithelial proliferations, insitu neoplasia, and Phyllodes tumour - may all pose a challenge both to the Histologist and Pathologist and also to the Surgeon. B3. There have been studies suggesting that the rate of malignancy in open biopsy resections for B3 lesions are as high as 25%. The incidence of malignancy in surgically excised radial scars has been seen to be between 19 and 31%.Our practice in accordance with QA guidelines is therefore to surgically excise B3 lesions. The results of our previous 5 year study showed that the rate of open benign biopsy within our institution was very low; the question was could we do any better and reduce the rate even further. The mammotome device was introduced into the department in 2004 and with the increased volume of tissue sampling the confidence of a definitely benign diagnosis may have improved. We looked at a further 5 years of data from the screening population to see if rates of open benign biopsy have remained steady or whether they have decreased. Our results show that there has been a steady decrease in the benign biopsy rate and the most recent data from 2008/9 shows a benign biopsy rate of o.3 per 1000 patients screened. Is this the end of the road - or is there potential to reduce the open excision rate even lower?

A-P8 Non cancer recalls: Do our local guidelines reduce recall rate?

Principal Author: V Parulekar

Oxford Breast Imaging Centre, Churchill Hospital, Oxford, UK

Contributing Authors: S Christopher, R English, R Adams, J Pickvance & J Baldwin, *Oxford Breast Imaging Centre, Churchill Hospital, Oxford, UK*

Aim: Minimum standard for recall to assessment following breast screening is less than 10% for prevalent and less than 7% for incident rounds according to Quality Assurance guidelines. High non cancer recall causes high recall rate. Our aim was to identify factors contributing to it.

Background: Retrospective audit of non cancer recalls was performed in 2006 which showed high incident recall rate. Audit also showed that 10% microcalcifications, 6% asymmetries, 3% ill-defined masses and 3% well defined masses formed unnecessary recalls. Local guidelines were put into place and re-A-Performed in 2008.

Method: All cases were audited for recall indication and effectiveness of guidelines, categorising in prevalent and incident.

Results: There was reduction in recall for microcalcifications and spiculate masses since 2006 but increase in ill-defined masses. Distortions and well-defined masses were unchanged. Recall for asymmetric densities remained same although there was increase in asymmetries in prevalent cases causing increased prevalent recall rate (13.9%). Overall incident recalls reduced since 2006 (3.89%).

Conclusion: Guidelines did not work for all abnormalities, warranting review and modification of practice. Arbitration of prevalent recalls was introduced and will be audited by December 2010.

D-P1 The new digital PERFORMS Self Assessment Scheme

Principal Author: A G Gale
Loughborough University, UK
Contributing Authors: Y Chen, *Loughborough University, UK.*

Purpose: To detail the new digital PERFORMS self assessment scheme.
Methods: The PERFORMS scheme has run nationally for over 20 years as a means of helping individuals maintain high screening skills. Whilst the system has been modified over time it has always used mammographic film. This has now stopped and FFDM images are employed.
Two digital versions of the scheme are being implemented. Initially, in early 2010, FFDM images have been made available for those screening centres which are fully digital. For centres yet to go digital then laser printed FFDM film images are available. Reporting on these images is via the dedicated PERFORMS computer. All individual and national reports are now available as downloadable PDF files from our website.
Subsequently, both FFDM images and platform independent reporting software will be downloaded directly from the website. Furthermore, a range of sophisticated training approaches are under development and will be available for download.
Results: Improved JAFROC analyses have been implemented to represent individuals' performance better by taking account of lesion location data.
Conclusions: The new scheme keeps apace of the digital changeover in the UK Screening Programme and enables individuals to access self assessment and training whenever they like.

D-P2 Development of a depository for level A QA data, including analysis functionality.

Principal Author: M S Higgins
Integrated Radiological Services, England

With the emergence of FFDM and their associated Quality Control Tests given in NHSBSP0702, radiographer QA has become more complex, requiring more measurements/calculations. Data entry software can help alleviate this burden by calculating parameters such as CNR, SNR and maximum deviation, once radiographers simply enter the fundamental values e.g. MPV and SD. Following automatic calculation of such parameters, definitive pass/fail results can be setup. This paper promotes the use of QA data spreadsheets as a minimum necessity when storing Level A QA data, to prevent the time consumption and risk of error associated with manually calculating such parameters.
Analysis software demonstrated in this paper is an improvement to keeping QA data on paper records. The ultimate goal is aimed towards creating an internet-based QA database depository to store data from many sites enabling simple, user-friendly data entry/analysis on a national scale. QADDS software provides such a depository, enabling filtering on QA scores between hospitals/areas, manufacturers/models with the possibility of relating if/how scores relate to dose. Data from systems that undergo faults can be saved, merged with other faulty equipment data and analyzed, providing the potential to determine whether a change/drift in any particular tests could indicate forthcoming problems.

D-P3 The Imaging Appearances of Macrolane

Principal Author: L Wilding
West Middlesex University Hospital, England
Contributing Authors: E K Hughes, *West Middlesex University Hospital, UK* & S Mc Williams, *Guy's and St Thomas' Hospital NHS Trust, UK*

Objectives: MacrolaneTM VRF (volume restoration factor) (Q-Med) is a relative newcomer to the field of breast augmentation. There is little published data available on the effect of this treatment on conventional breast imaging, or of any possible complications resulting from Macrolane injection. We will illustrate the sonographic, mammographic and MRI appearances seen in a number of patients following treatment. It is likely to become increasingly important that such appearances are readily recognised by breast radiologists when treated patients attend symptomatic clinics.
Methods/Results: This study describes the imaging findings in 7 patients from 2 centres, all of whom had undergone Macrolane injection at varying intervals prior to presentation. Macrolane consists of Non- Animal Stabilised Hyaluronic Acid (NASHATM), its use indicated in non surgical breast enlargement / reshaping. Treatment involves injection of 100ml of fluid, above the pectoral muscle and deep to the glandular breast disc and is semi-permanent, with top up injections available. We describe the subsequent imaging appearances and possible treatment complications, such as abscess formation.
Conclusion: The presence of Macrolane in the breast can present diagnostic challenges, both for clinicians and breast imagers. This review aims to clarify the likely radiological appearances following its use.

D-P4 On the road in a wireless world

Principal Author: V Pridmore
BreastScreen Victoria, Australia

The challenge in the shift to a digital breast screening environment is to make our services better for women.
Getting the digital image is the easy part. Re-imagining the way we work behind the scenes, with both people and technology is the challenge.
This case study will showcase how the implementation digital mammography integrated with a 3G wireless network on a Mobile Screening Service (MSS) has changed how BreastScreen Victoria delivers our service in remote rural areas. The MSS may operate up to 450 km (280 miles) from the BreastScreen Centre where images are reported and clinical assessment occurs.
In transitioning the MSS to digital, the demand was to balance

stakeholder and program needs while ensuring the service was accurate, fast, and convenient for women and the three major stakeholders – the radiographer, the radiologist, and the Program.

Integrating the client information system with the PACS, establishing hanging protocols, digitizing prior images to ensure a fully soft-copy reading environment, accessing sufficient wireless bandwidth to allow fast image transmission and re-engineering the workflow have all been integral in realizing the full potential of digital mammography.

D-P5 Use of digital breast tomosynthesis in pre-operative localisation of non-palpable mammographic abnormalities

Principal Author: S Dyson

King's College Hospital, UK

Contributing Authors: A. Iqbal, V. Phillips, V. Milnes, R.K. Wasan, D.R. Evans, C. Peacock & J.C. Morel, *King's College Hospital, UK*

Purpose: To illustrate the use of DBT in the radiological and surgical management of subtle mammographic abnormalities.

Methods: DBT has been used in pre-operative localisation and per-operative specimen radiography for patients with subtle mammographic lesions which are difficult to visualise on conventional 2D full field digital mammography. The localising wire has been inserted under ultrasound or mammographic guidance and DBT has been carried out in the cranio caudal and lateral projections to demonstrate the position of the wire. Specimen radiography has been performed using DBT to confirm that the mammographic abnormality has been excised and is included in the specimen.

Results: Over a ten month period, 75 wire localisations were performed. Out of these, 10 had very subtle mammographic signs (most commonly parenchymal distortion) on 2D digital mammography but were clearly visible on DBT. Pre-operative DBT demonstration of the wire position and per-operative DBT examination of the surgical excision specimen proved helpful in the management of subtle mammographic abnormalities.

Conclusions: This educational poster will demonstrate the effective use of DBT in the radiological and surgical management of these difficult lesions.

D-P6 The role of current imaging methods to evaluate Male Breast Cancer?

Principal Author: P Bhaskar

University Hospital of North Tees, Hardwick, Stockton on Tees, UK

Contributing Authors: G Holdsworth, L Noor & I Webb, *University Hospital of North Tees, Hardwick, Stockton on Tees, UK.*

Aim: To determine the sensitivity and specificity of mammography and ultrasound in diagnosing male breast cancer.

Current literature suggest that good clinical examination is the foremost modality to diagnose male breast cancer. The role of breast imaging in male patients is debatable, breast cancer is substantially less common than gynecomastia and accounts for 1% of all cases of breast cancer and 0.17% of all cancer cases in men. We conducted this study to evaluate the appropriate imaging techniques and their role in male patients with breast symptoms.

Method: We retrospectively reviewed clinical, radiographic, and pathologic records of all male patients referred between October 2006 to December 2009. Statistical analysis was done using Microsoft excel. Radiological/pathological correlation was performed using BiRads score for imaging and sensitivity, specificity, positive and negative predictive value (PPV & NPV) and accuracy of imaging was determined.

Results: The accuracy data for the imaging is as follows sensitivity 70%, specificity 97%, PPV 77%, NPV 96% and accuracy 94%.

Conclusion: All male patients should undergo triple assessment even though the accuracy of imaging modalities are not as high as it is in female patients.

D-P7 The Magnetic Resonance Imaging Features of Ductal Carcinoma in Situ

Principal Author: J Parikh

Guys and St Thomas' Hospitals NHS Foundation Trust, UK

Contributing Authors: R Perera, AF Jones, S McWilliams, Julie Scudder & G Charles-Edwards, *Guys and St Thomas' Hospitals NHS Foundation Trust, UK.*

Purpose: To illustrate the MRI features of ductal carcinoma in situ (DCIS).

Background: DCIS accounts for 20% screen-detected cancers and 30-50% clinically occult cancers. MRI has a sensitivity and specificity for detecting DCIS of 77-96% and can detect both calcified and non-calcified (mammographically occult) DCIS.

Method: Three consultant breast radiologists experienced at reading breast MRI retrospectively reviewed the MRI appearances of histologically proven DCIS in 27 women who had breast MRIs between March 2006 and January 2010.

Results: DCIS was seen as four nonmass-like morphologic subtypes: ductal (branching) 33%, linear (non-branching) 15%, segmental (triangular with the apex pointing towards the nipple) 30%, and regional (extensive enhancement not conforming to a ductal distribution) 41%. Three types of internal enhancement patterns were seen: nodular (clumped) 78%, amorphous (homogeneous/heterogeneous) 26%, and linear (non-nodular) 11%. 15% showed more than one type of morphology/ internal enhancement. Various MRI enhancement curves (persistent, plateau, washout) were seen.

Conclusions: The most common appearance of DCIS demonstrated in our study was nodular enhancement in a ductal or regional distribution, in keeping with the existing literature. Recognition of these features of DCIS on MRI is important for detecting and determining the extent of disease and for planning treatment [1,2].

References:

1. Raza S et al. Pure ductal carcinoma in situ: a range of MRI features. *AJR* (2008); 191:689-699.
2. Ikeda D et al. Breast Imaging Reporting and Data System,

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BI-RADS: Magnetic Resonance Imaging (BI-RADS MRI). Reston, VA: American College of Radiology (2003).

D-P8 A review of functional magnetic resonance imaging in breast cancer.

Principal Author: E A M O'Flynn

Clinical Magnetic Resonance Group, Royal Marsden NHS Foundation Trust, Sutton, Surrey, UK

Contributing Authors: EAM O'Flynn, SD Allen, ARM Wilson & NM deSouza, *Royal Marsden NHS Foundation Trust, Sutton, Surrey, UK*

Functional magnetic resonance imaging (MRI) is an emerging technique that can detect changes in metabolism and perfusion of tumours, before morphological changes are evident. Originally pioneered as a technique for exploring brain activation, functional MRI is rapidly evolving as a capable non-invasive assessment tool for the diagnosis, staging and treatment of breast cancer.

We provide an illustrated review of current functional MRI techniques as applied to breast cancer, including:

Dynamic Contrast Enhanced (DCE) MRI: In addition to the enhancement curve that is calculated, a variety of kinetic parameters can be derived that give information on the microcirculation of a lesion relating to vascular permeability and the surrounding interstitium.

Diffusion weighted (DW) MRI: This quantifies thermally induced motion of water molecules. The derived apparent diffusion coefficient (ADC) values provide an insight into the microcapillary perfusion and water composition of a tumour and degree of tumour viability.

Blood Oxygen Level Dependent (BOLD) MRI: Deoxyhaemoglobin in red blood cells has paramagnetic properties which are reflected in the T2* relaxation of tissues resulting in a visual representation of hypoxia.

Magnetic Resonance Spectroscopy (MRS): This gives information about the chemical content of breast lesions, and can be focussed to detect those that are elevated in neoplastic tissues highlights the altered pattern of MR visible chemical constituents (such as choline containing compounds and lipids) seen in cancer tissues.

D-P9 "Standardising perception of image quality through technique"

Principal Author: S Williams

Breast Test Wales, North Wales

Contributing Authors: E Jones, L Whittingham & A Gash, *Breast Test Wales, North Wales.*

Background: Technical recalls cause delays in the reporting process, increase radiations dose and patient anxiety.

When reporting radiographers start reporting screening images, the technical recall rate can increase. It is desirable to avoid this without compromising quality.

Method: A system was implemented to identify borderline images that whilst being diagnostically adequate require some technical improvement.

Our unit recalls clients for assessment via consensus rather than arbitration.

During the consensus process both radiologists and reporting radiographers highlight these images by placing labels on them identifying the problem e.g. unsharpness. The images are then made available to the radiographers, allowing them to receive continual feedback, allowing for individual continual professional development.

In turn this process improves overall image quality and directly impacts on technical recall rates.

Results: Evidence suggests that the system has improved standards by raising awareness of image quality and improving certain technical tendencies, making images more uniform allowing for easier interpretation.

Conclusion: This system has had a positive impact on quality as well as aiding the continual professional development of staff; consideration has been made for future digital provisions, and it is believed that this system could work well within a digital environment with simple adaption.

D-P10 What can be learned from juvenile breast referrals, a rare important subgroup?

Principal Author: A M Murphy

York Hospital, UK

Contributing Authors: J Cooper, *York Hospital, UK*

The purpose of this poster is to educate breast multidisciplinary team (MDT) members about the most common paediatric breast problems.

Although small in number they are an important group and can cause both diagnostic and treatment dilemmas.

It is vital that conditions specific to this age group are recognised and treated appropriately. Dealing with children/young teenagers means interacting competently, confidently and professionally with them and their parents/carers.

This poster will improve the MDT members' ability to do this by raising awareness of the features and treatment of the following conditions- juvenile squamous metaplasia, peri areolar non puerperal abscess formation, premature puberty, gynaecomastia and juvenile fibroadenoma.

D-P11 Unusual benign lesions presenting at the one stop breast clinic

Principal Author: N Sharma

The Leeds Teaching Hospitals NHS Trust, UK

Contributing Authors: M.E Fletcher, A Sanders, I Haigh & B.J.G Dall, *The Leeds Teaching Hospitals NHS Trust, UK.*

This is a pictorial representation of unusual benign pathologies presenting at the one stop breast clinic. It emphasises how important triple assessment is in evaluating and managing these cases. A brief description will be given relating to the presenting symptoms, radiological and pathological findings and important take home messages. The cases that will be described are the following

Case 1 Erdheim – Chester Disease (ECD)
Case 2 CSF breast pseudocyst
Case 3 Sarcoid
Case 4 Apocrine Cyst
Case 5 TB within an axillary lymph node
Case 6 Hydrocolloid injections as part of breast augmentation in a woman who is post partum and has galactocoeles.
Case 7 Kikuchi Syndrome

D-P12 Continuing Professional Development Audit-The good, the bad and the ugly!

Principal Author: J Y York
Breast Unit, Royal Derby Hospital, UK
Contributing Authors: S Farmer, *Breast Unit, Royal Derby Hospital, UK.*

Radiographers, for the first time, in 2010 have been randomly selected for an audit of their continuing professional development (CPD) by the Health Professions Council. Registrants must successfully complete and meet the required standards for CPD as set out by the Health Professions Council to continue to be registered for their profession.
This poster presents the differing experiences of the two Mammography Radiographers selected locally for this audit. We present a practical approach to the considerable work involved in this audit task. The methods used to gather, analyse and present relevant information, will be clearly shown. One Mammographer, despite considerable training and documented CPD in the last two years initially had their documentation returned, while the other met the required standards at their first submission. Review of submitted material and lessons learned to achieve success in this new area will be clearly presented.
Our aim is to assist radiographers called to submit their CPD in future audits to learn from our experiences and be successful with their ongoing CPD.

D-P13 Quality Assurance (Q.A.) in Breast Ultrasound

Principal Author: J L Brown
Bolton Breast Unit, UK

Purpose: The aim of this study was to develop an ultrasound quality assurance programme to be used in Bolton Breast Unit, as one was not in operation.
An effective quality assurance programme ensures consistent high quality and optimum equipment performance, reducing the down time of the ultrasound machine which is very difficult to manage.
Method: A variety of quality assurance ultrasound tests were researched and the most appropriate chosen to be included and used in the Bolton Breast Unit ultrasound quality assurance programme.
Quality assurance tests were divided into Daily / Weekly Tests, Monthly Tests, Other Tests and Audit.
Conclusion: Quality Assurance programmes are required to ensure a good standard of practice. All staff using ultrasound scanners should be aware of any reduction in image quality due to equipment failure and know the method of fault reporting.
Modern systems are very reliable and only occasionally malfunction, thus very few tests are done by departmental staff with the majority of testing done by service engineers.
Each ultrasound department should devise their own quality assurance programme which suits the needs of the ultrasonographers / department.
The quality assurance programme must be easy to implement, simple to use and easily understood by ultrasound staff.

D-P14 Is Ultrasound Indicated in Unilateral Gynaecomastia? Four Unusual Case Reports

Principal Author: J M Leadbetter
Linda McCartney Centre, Royal Liverpool Broardgreen University Hospital Trust, UK
Contributing Authors: U Sridharan, T Giles, P Smith & V Aachi, *Linda McCartney Centre, Royal Liverpool Broardgreen University Hospital Trust, UK*

Unilateral gynaecomastia is usually evaluated by clinical examination and hormone profile. Ultrasound and ultrasound guided biopsies may play a significant role in its management.
Case 1: 20 year old man presented with 3 year history of large non-tender swelling in right breast requesting correction of unilateral gynaecomastia. Prior to surgery, ultrasound showed a 50mm cyst which was aspirated and did not recur avoiding unnecessary surgery.
Case 2: 67 year old man presented with a well defined lump which was clinically suspicious Ultrasound showed glandular tissue containing a normal intra-mammary lymph node, confirmed by FNAC.
Case 3: 58 year old man presented with a hard irregular lump in the left retro-areolar region, suspicious of malignancy. Ultrasound showed gynaecomastia. FNAC and core biopsy showed atypical columnar cell hyperplasia and papillomatosis. Patient now has mammographic surveillance.
Case 4: 23 year old man presenting with unilateral gynaecomastia had generalized lymphadenopathy on clinical examination. Ultrasound showed gynaecomastia and grossly enlarged lymph nodes. FNA and core biopsy from breast and axillary node showed Langerhans cell histiocytosis,
Conclusion: As demonstrated by these cases Ultrasound and ultrasound guided biopsies in unilateral gynaecomastia may change patient management by excluding sinister pathology and avoiding unnecessary surgery.

D-P15 'Do you do this all day?' - Assistant Practitioners, how they are seen?

Principal Author: C L C Chapman
Park Centre for Breast Care, Brighton, UK
Contributing Authors: S Safvatnia, A Riley, T Bennett, L Watson & G Rubin, *Park Centre for Breast Care, Brighton, UK*

We choose to use our assistant practitioners in clinical roles. We

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have taken the views of assistant practitioners at all levels of experience, from those who have recently started to those with 8 years experience. The other members of our multidisciplinary team that they work with were also asked to comment on the assistant practitioners' role and value.
The presentation is a series of quotes. The most striking feature was that other team members valued the assistant practitioners far more than the assistant practitioners felt valued themselves.

D-P16 Location Location Location

Principal Author: T F Ridley
Great Western Hospital, UK
Contributing Authors: SJ Taylor & K Wilmot, *Great Western Hospital, UK.*

Background: Skin lesions may often be seen on breast imaging. We present a variety of skin abnormalities illustrating them with mammography, ultrasound, and CT. The abnormalities include, warts, sebaceous cysts, tumour, infection, burns, artefacts such as tattoo's and piercings and neurofibromatosis.
Method: Poster presentation of abnormalities.
Results: Illustrated skin lesions
Conclusion: It is important to recognise the different appearances of skin lesions.

D-P17 Pictorial Review of Benign Breast Conditions

Principal Author: E K Hughes
West Middlesex University Hospital NHS Trust, UK
Contributing Authors: F Aref & L Wilding, *West Middlesex University Hospital NHS Trust, UK*

Purpose/Background/Objectives: Benign conditions account for the majority of breast lesions, which often present to the symptomatic one-stop breast clinic. Most can be easily characterised on mammogram and ultrasound. Occasionally, their diagnosis can pose a diagnostic dilemma and can create uncertainty for both the clinician and patient.
Methods: A selection of common and interesting benign breast cases were taken from the imaging database in a busy district general hospital. They were reviewed by 2 experienced Breast Radiologists. Mammographic and ultrasound appearances and pathology results were correlated.
Results: A number of benign breast conditions were reviewed and categorised into:

1. Common and typically benign: fibroadenoma, lipoma, cyst, galactocoele, sebaceous cyst, seroma, abscess, axillary accessory breast tissue and gynaecomastia.
2. Less common: hamartoma, haematoma, silicon adenosis, and histiocytoma.
3. Cancer mimics and B3 lesions: fat necrosis, papilloma, phyllodes, granulomatous mastitis, post-radiotherapy change and radial scar.

Conclusions: Our review illustrates the majority of benign conditions of the breast, some of which are rare or may mimic cancer and how one can overcome these diagnostic challenges.

D-P18 Digital mammogram machines for specimen x-rays, an alternative to digital x-ray cabinets

Principal Author: G Rubin
Park Centre for Breast Care, Brighton, UK
Contributing Authors: C Chapman, *Park Centre for Breast Care, Brighton, UK*

Introduction: Digital specimen x-ray cabinets became very common in analogue departments because they allowed the operator to see if microcalcifications were present in stereotactic biopsy specimens within a few seconds. However in digital departments with a second mammogram machine the same information can be obtained just as quickly by x-raying the sample on the second machine. This presentation will describe the technique to obtain maximum geometric magnification and most detail of microcalcifications in core specimens.
Technique: The following used a GE Essential but we believe a similar technique can be used on any digital mammogram machine.
The mammogram machine was set up for standard geometric magnification which on the GE requires placing the magnification table over the digital detector. However instead of placing the specimen on the table the specimen was placed on top of the magnification paddle which was raised to its maximum height. This gave a geometrical magnification of X 3.5. It was then imaged using a manual exposure of 22kv 18mas with Rhodium/ Rhodium settings. The subsequent image gave enough magnification with high definition to identify any microcalcification, further enhanced by photographic magnification at the workstation.

D-P19 Invasive Lobular Breast Cancer

Principal Author: J M Lawrence
Queen Mary's Hospital, Sidcup, UK, Canterbury Christ Church University, UK

This poster aims to show a patient pathway through diagnostic radiography, from mammography (NHSNBSP) following the NICE Guidelines through ultrasound, biopsy and MRI or surgical staging.
There is a brief description about the cancer itself and the poster is based upon a fictional case study and contains up-to-date referencing.
The poster mainly concentrates on diagnostic radiography and complimentary modalities within radiology and includes future innovations.

D-P20 Fibromatosis of the Breast mimicking Breast Carcinoma

Principal Author: S A Willson
Taunton and Somerset NHS Foundation Trust, UK
Contributing Authors: P A Middleton & E Burd, *Taunton and Somerset NHS Foundation Trust, UK.*

A 52 year old woman presented with a discrete lump in the left breast with associated skin distortion.

The mammographic and ultrasound appearances were those of an ill defined mass and highly suspicious for malignancy
Ultrasound core biopsy of the mass showed an infiltrative spindle cell proliferation suggestive of fibromatosis.
Excision biopsy of the lesion demonstrated aggressive fibromatosis.
Primary mammary fibromatosis is a rare condition which accounts for less than 0.2% of all breast neoplasms. Core biopsy is required to make an accurate diagnosis as FNA may be non diagnostic or give a false positive diagnosis of malignancy.
In view of the locally aggressive nature of these lesions their management requires wide surgical resection. Some of the cases described in the literature required removal of part of the chest wall to gain control of the disease.

D-P21 Using Mammography in Uzbekistan to diagnose breast diseases

Principal Author: D Mirrakhimova
Tashkent Institute of Advanced Medical Education, Uzbekistan
Contributing Authors: D. Mirrakhimova & G. Shishlova, *Tashkent Institute of Advanced Medical Education, Uzbekistan.*

Introduction: The disease of breast is treated more successful if it was detected on the early stage of development. Use of Digital Mammography of diagnostics helps to detect breast diseases on early stage.
Material and research methods: The audit will include data for 12-month period from January 2009 before January 2010. We have surveyed 700 patients aged between 13 to 75 years old. These patients had various breast diseases. We used the following methods: ultrasound research, digital mammography, magnetic resonance.
Ultrasound was made on Aloca 6-30 SSD machine, mammography was made on Mammomat Novation 3000 Nova machine, and Magnetic resonanse was made on Siemens Somatom ARTX machine.
Results: Such formations as nodus, cista, fibrosis at young women under 35 were well detected using ultrasound.
Mammography helped to detect tumours sized in diameter 0,2-0,3 inches. It should be taken into consideration, that microcalcifications are the only sign, that help to suspect cancer.
Magnetic resonance allowed to visualize back part of mammary glands and retromammary space, and also allowed to detect small nodular metastasis lymph nodes of mediastinum.
Conclusions: Taking into consideration above-stated facts, it is possible to conclude that digital mammography and ultrasound are main methods of diagnosis of breast diseases at women.

D-P22 Mammograms by Satellite: Integrated technology helping to save lives in rural communities

Principal Author: M A Mcleod
Breast Screen Waitemata Northland, New Zealand
Contributing Authors: B A Leeves & A Cave, *Breast Screen Waitemata Northland, New Zealand*

BreastScreen Waitemata Northland's new service is New Zealand's first mobile digital breastscreening unit and the first in Australasia to transmit images via satellite from a mobile site, bringing together the latest in truck-building, digital mammography and satellite communication technology.
Previously, with the analogue unit, there was a delay of up to five days between the time of the mammogram and when the films were available for reading. Any technical recalls, due to image quality, also caused a great deal of additional stress and inconvenience to women in rural areas resulting in even longer delays in reading and results.
The new digital machine captures the image within seconds, enabling the radiographer to check the quality before the woman leaves the unit.
The satellite technology is a key aspect of the unit, providing a live worklist to the modality, ability to enter data into the RIS in real time and transmit images from the on-board PACS to the PACS at base.
This state-of-the-art mobile breast screening unit is an example of the way new technology can be implemented for the benefit of communities without easy access to up-to-date healthcare services.

D-P23 The Use of Elastography to Distinguish Benign from Malignant Breast Lesions

Principal Author: E Asken
Victoria Breast Centre Macclesfield, UK
Contributing Authors: A Clarke, *Victoria Breast Centre Macclesfield, UK & J Dodgeon, Salford University Manchester, UK*

Introduction: Hippocrates described the hardness of breast cancers almost two and a half millennia ago when palpation was the only diagnostic method available for detection of breast tumours. Ultrasound elastography combines this ancient method with new imaging technologies for increased diagnostic accuracy.
Background: Elasticity is the tendency of objects to return to their original size and shape after a force deforming them has been removed. Hooke's law states that in an elastic material, strain is proportional to stress.
Method: During imaging, axial detection pulses are continuously transmitted throughout the field of view, to provide information about the deformation along this axial line. Ultrasound information is obtained before and after compression, measuring the change in the tissue dimensions. This differentiates any stiffer areas from softer tissue.
Results: The acquired information is mapped over the grey scale image using a colour scale, where green represents soft lesions & blue represents stiff lesions. The resulting elastograms are evaluated using a scoring system from 1-5, 1 being green (benign lesion) and 5 being blue (malignant lesion).
Conclusion: Real-time Elastography helps conventional ultrasound in characterising breast lesions. Elasticity imaging, when used as an adjunct to B-mode and Power Doppler imaging, can improve diagnostic accuracy.

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