evaluate the accuracy of image interpretation and improve the validity and reliability of mammographic practice.

Though our study results are in recommended ranges, we believe that with Phosphor-Screen digital imaging it is possible to reach the standards expected for conventional mammography.

121 POSTER

The Singapore national breast screening programme: implementation and first year results

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Breast cancer is the largest cause of cancer deaths in Singapore women. Singapore has the highest incidence of breast cancer of any Asian country or city, with a peak incidence in the 50–55 age group and an age-adjusted incidence of 53.1 per 100,000 women-years.

In January 2002, BreastScreen Singapore was launched. This is the first Asian national mammographic breast screening programme. It is coordinated by the Singapore Health Promotion Board. Women 50–64 are invited biannually, and women 40–49 are eligible to be screened annually.

Service delivery is distributed, with no comprehensive one-stop centres. There are currently 12 satellite mammography centres, mostly based in government polyclinics. There are 4 specialist reading centres, one of which is in the private sector, and 2 recall assessment centres, both of which are hospital-based.

BreastScreen Singapore is uniquely structured and funded. Funding is based on a co-payment model from screening through to diagnosis and treatment. Clients pay half the usual fee for screening mammography; the remainder is paid through a government subsidy. Subsidies for assessment and biopsy are through the existing hospital fee system.

Government financial commitment is for centralized administration and funding through the Health Promotion Board, which coordinates service provision, accreditation, quality assurance, data collation and analysis, publicity and education programmes.

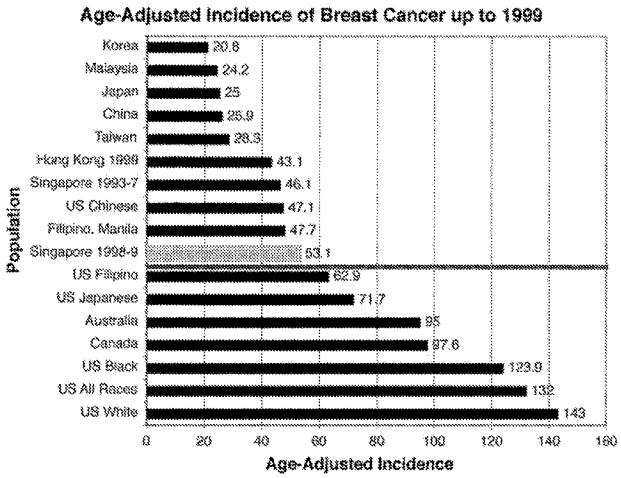
Key advantages of this system are long-term ongoing financial viability for service providers, flexibility in development and scaling of the programme over time, and a reasonable reading fee to ensure ongoing radiologist involvement.

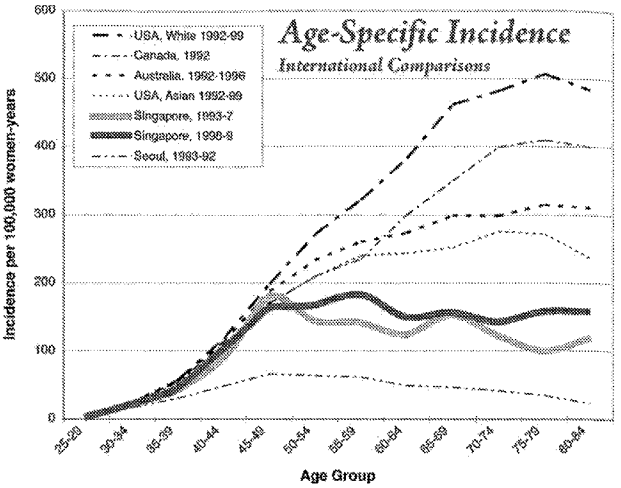
By mid-2004, centres will be linked by an integrated web-based database for recruitment, scheduling, reading and assessment with live on-line data entry, query and results reporting. This system will be linked to the National Cancer Registry.

Statistics for the first year of the programme are summarised in Table 1.

Table 1. BreastScreen Singapore First Year Statistics

Descriptor	Statistic
Screens read	35,600
Ages <50 : >50	54% : 56%
Recalled for assessment	3036 (8.5%)
Cancers in recalled women	172 (0.5% of screens)
DCIS detection rate	35% of diagnosed malignancies
Needle biopsy rate	21% of assessments
Assessment cancer detection rate	6% of assessed women





122 POSTER

Interval cancers in the breast cancer screening program of Strasbourg (France)

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The evaluation of interval cancers is a major indicator of the efficiency and quality of a breast cancer screening program.

The Ademas program started in 1989 in the department of Bas-Rhin in France. The interval cancers are defined as cases of invasive cancer occurring in negative screened patients, before the next screening examination would have taken place, i.e. during the 2 years period. This group consists of cancers that were existent at the time of screening but "missed" for some reason, as well as newly developed (incident) cancers.

After a precise census performed by correlation with the Cancer Registry of Strasbourg, all the mammograms of the test just preceding the diagnosis of the interval cancer have been reviewed to classify interval cancers into true interval, minimal signs or false negative. The mammographic revision is a blind method including the mammograms of the interval cancers in a large set of normal and positive tests of the same period so that the reader is put in similar conditions to his usual interpretation.

The repartition of radiological images in each category was studied, especially to compare false negative and minimal signs. The radiological sign more often missed seems to be masses and not some subtle sign, only seen by comparison with previous mammograms. The identification of the types of images which are more often in relation to the occurrence of an interval cancer is much important for the improvement of the screening programme and the training of the radiologists.

Because of the increase of complaints about screening programs, it becomes important to define the conditions of rereading during an expert's report. This is the only way to give precise figures on acceptable level of each type of interval cancer and the results of this expertise could be of great help in medico-legal problems.

123 POSTER

Core needle biopsy for breast cancer: discrepancies in pre- and post-operative pathology reports

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Background: Pre-operative core biopsies have a high sensitivity for the diagnosis of breast cancer. Pathologic interpretation of pre-operative core biopsies is one of the central factors in modern algorithms for the surgical treatment of breast cancer. Diagnosis of invasive ductal carcinoma (IDC) as ductal carcinoma in situ (DCIS), or inadequate assessment of tumor grade on pre-operative core biopsy may impact on whether sentinel node biopsy is undertaken. If tumor ablation were contemplated, it would not even be possible to reach the correct diagnosis. With these possibilities in mind, we assessed the accuracy of core biopsies in predicting the final pathology.

Methods: Pathology reports from the pre-operative core biopsy and the surgical specimen for 160 breast cancer patients were retrospectively analyzed. All core biopsies for microcalcifications were performed using the 11G Mammotome needle. When the pre-operative diagnosis of DCIS

changed to IDC after surgery, the pre-operative core biopsy specimens were reviewed.

Results: Of 160 pre-operative core biopsies, 17 (10.6%) showed DCIS, 110 IDC, 20 lobular invasive carcinoma and 16 had other cancers. The final pathological diagnoses were: DCIS 13 (8.1%), IDC 107 (66.9%), invasive lobular carcinoma 19 (11.9%), others 21 (13.1%). Four (23.5%) of those diagnosed as DCIS on core biopsy turned out to contain IDC. In all four cases the tumors were palpable, with a diameter of 10 mm or more. In 56 (52%) cases with IDC grade was not determined on the core biopsy specimen. Of those 51 (48%) in which grade was determined, there was a discrepancy of up to 2 grades between pre-operative and surgical pathology reports in 5 (9.8%) of the cases. In only 1 of the 5 tumors with vascular or lymphatic invasion was the information available from the core biopsy.

Conclusions: Information obtained from core biopsies regarding tumor type and grade is often incomplete. One quarter of tumors diagnosed as DCIS are subsequently found to include an invasive component (all palpable in our series). Even when the diagnosis of IDC is made on core biopsy, there is frequently a discrepancy in assessment of tumor grade or lymphovascular invasion. Since information from diagnostic core biopsies is crucial in decision-making for sentinel lymph node biopsy and the emerging technology of tumor ablation, the possibility of a discrepancy between findings in core biopsies and surgical specimens should be taken into account in patient selection and efforts should be made to reach a more accurate pre-operative diagnosis.

124 POSTER

Histological core needle biopsy of palpable breast lesions: image guided or palpation guided

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Purpose: Histological core needle biopsy of palpable breast lesions can be performed either by image guidance (stereotactic or ultrasonographic) or by palpation guidance. The purpose of this study is to determine differences in diagnostic performance of the histological core needle biopsy obtained by different kinds of guidance techniques.

Patients and methods: Retrospectively a group of patients with a palpable breast lesion who underwent a histological core needle biopsy was studied. Between January 1999 and July 2002 239 women with 267 palpable breast lesions (mean age of 53.0 years) underwent a histological core needle biopsy, because of non-conclusive triple diagnostic tests. The choice for a free hand or an image-guided technique was mainly influenced by logistic reasons such as a long waiting list for a radiological appointment. The histology of the core needle biopsy was compared with the findings at excision (216), or follow-up (51).

Results: The histological core needle biopsy was performed on palpation in 58 cases and by image guidance in 209 cases (ultrasonography in 167 cases and stereotactic in 42 cases). The mean size of the palpable breast lesions biopted by palpation was significant larger. Seven times the result of the histological core needle biopsy was inconclusive (twice at palpation, five times by imaging). Histological core needle biopsy by palpation showed a sensitivity of 0.71 and a specificity of 0.93. Biopsy by image guidance (although smaller in size) showed a better sensitivity (0.93, $p<0.001$) and specificity (0.99, $p=0.057$).

Conclusion: Free-handed histological core needle biopsy of a palpable breast lesion has an insufficient diagnostic performance compared to an image guided technique. Size seems a pitfall for physicians to perform a histological core needle biopsy free-handed and not by image guidance. Once a histological core needle biopsy is indicated it should be performed by image guidance. The organisation of diagnostic procedures should be adjusted to this accordingly.

125 POSTER

Clinically and mammographically occult breast lesions at MR Imaging: potential impact of computerized assessment on clinical reading

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Purpose: To investigate whether computerized analysis of clinically and mammographically occult breast lesions at MR imaging complements clinical reading, how it complements clinical reading, and to assess the potential impact of the system.

Material and methods: An existing computerized analysis system was enhanced by training on 100 breast lesions and validating on 136 independent lesions. Seventy-five lesions in the training were also graded in daily clinical practice. These grades (5-point scale: benign, probably benign, indeterminate, suspicious, highly suggestive of malignancy) and the probability of malignancy calculated by computerized analysis were entered as covariates in logistic regression analysis to obtain a combined model. The performance of the model was compared with that of clinical reading alone in order to provide guidelines when and by how much computerized analysis is able to complement clinical reading. For this purpose, an independent set of 72 clinically and mammographically occult lesions was read in clinical setting, and assessed by the combined model.

Results: The performance of reading in clinical setting (A_Z=0.86) was similar to that of the computerized analysis (A_Z=0.85; p=0.99). A significant improvement was obtained by the combined model (A_Z=0.91; p=0.03). Improvement was mostly accomplished for lesions graded indeterminate and suspicious by the radiologists. In the combined model, an increase in specificity of approximately 20% was observed without reduction of sensitivity.

Conclusions: Computerized analysis complements clinical reading, making computer-aided diagnosis feasible. The complementary information has the potential to increase the specificity for clinically and mammographically occult lesions without reducing sensitivity.

126 POSTER

The 2001/02 ABS at BASO Audit – repeat therapeutic operations and pre-operative history

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The 2001/02 ABS at BASO audit included 10,191 cancers detected by the UK NHSBSP between 1 April 2001 and 31 March 2002. 93% of invasive cancers and 73% of non-invasive cancers had a pre-operative diagnosis. 98% of B5b (Invasive) cancers and 92% of C5 cancers had surgical confirmation of invasive cancer. 470 (25%) B5a (Non-invasive) cancers were found to be invasive following surgery. 97% of B5b (Invasive) and C5 cancers had known nodal status whereas only 84% of B5a (Non-invasive) cancers had known nodal status.

Overall, 14% of invasive cancers and 20% of non-invasive cancers underwent more than one surgical operation. 41% of the B5a (Non-invasive) cancers had repeat operations; 34% involving axillary procedures. In one UK region, 97% of B5a (Non-invasive) cancers had known nodal status, 54% being determined on the basis of repeat operations involving the axilla. Screening units within this region thus have a policy of returning to obtain nodes following the unexpected discovery of invasive disease following surgery. In two UK regions, where the proportion of B5a cancers with nodal status was between 70% and 71%, repeat operation rates were lower than in other regions (27% and 30% respectively). It would therefore appear that there is an unwillingness in these regions to carry out a repeat operation to determine the nodal status and that as a result, a proportion of women may have been under diagnosed.

Overall, 7.1% of invasive cancers with a C5 pre-operative diagnosis had their nodal status determined as a result of axillary procedures undertaken as repeat operations. In one UK region, without these additional axillary procedures, the proportion of cancers in this group with known nodal status would have been 66% rather than 87%. It would thus appear that in this UK region there is a reluctance to carry out an axillary nodal procedure at the first operation for cancers diagnosed pre-operatively by cytology alone, and that repeat operations are subsequently undertaken for a high proportion of invasive C5 cancers in order to determine the nodal status.

The 2001/02 ABS at BASO audit data thus demonstrate clear differences in the treatment protocols followed within the UK NHSBSP.

127 POSTER

Impact of random variations in the measurements of tumor extent on the WHO and the RECIST guidelines for solid breast tumors

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Purpose: To quantify the fraction of false-positive calls on tumor regression and tumor progression using the WHO and the RECIST guidelines for solid