E13. International Breast Ultrasound School

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Current status and future trends in breast cancer screening

Population-based breast screening has provided the opportunity for mortality reduction for more than 20 years. The various randomised trials of screening carried out in the 1980s demonstrated significant mortality benefits from X-ray mammographic screening, of up to 30% in the invited population and over 40% in those who actually participate [1–4]. This benefit is largely confined to women between the ages of 55 and 70 years when screened [1,2]. For reasons yet to be clearly defined, women in the age range 50–55 years show little or no benefit, while women in the age range 40–50 years show a benefit of approximately 20% [1]. The reasons for this are partly related to the differences in breast cancer biology in younger women and around the menopause and partly because of the limitation of mammography in younger women. The sensitivity of mammography for breast cancer in the mammographically fatty breast approaches 98%, while this falls as low as 45% in the dense breast. As a result there has been considerable interest in other methods of screening in younger women and older women with dense breast that renders mammography less sensitive to the early signs of breast cancer. Ultrasound is advocated for this purpose. The number of studies carried out to date has been small, but the few that are available suggest that ultrasound can improve the sensitivity of screening significantly in those with dense mammograms [5,6]. Reports suggest that small cancer detection in women with dense breast can be improved by up to 40% [6]. However, ultrasound has many problems compared with mammography in the screening setting. It is operator-dependent, time-consuming and associated with as much as four times the false positive rate compared with X-ray mammography [6]. Ultrasound is also not sensitive to many of the early signs of breast cancer, such as architectural distortion, subtle asymmetric parenchymal densities and clusters of microcalcifications. Thus, at present ultrasound can only be advocated as an adjunct to mammography in the dense breast. There are no studies that have yet demonstrated ultrasound as being either a primary and adjunctive technique that provides any mortality benefit in the screening setting.

Improvements and advances in X-ray mammography techniques do show some promise for the future. The most important advance in recent years has been the introduction of full-field digital mammography (FFDM) [7]. The Digital Mammographic Imaging Screening Trial (DMIST) study carried out in the United States of America (USA) has recently been published [8]. This multicentre study compared the efficacy of conventional film screen mammography with FFDM in the same screening populations. Cancer detection rates were not different in fatty breast, but were significantly higher in women with dense breast and in younger women. Whether this is sufficient to translate into any mortality benefit is yet to be determined. Digital mammography offers the opportunity to apply computer-aided detection technology, but again studies to date have not shown any significant improvements in performance [9]. Mammography tomography is also a technique that is likely further to improve the performance of FFDM.

Screening of younger women, particularly those at increased risk through their family history, is increasingly being done. Recent studies have shown that neither mammography or breast ultrasound have sufficient sensitivity to make them likely to offer a mortality benefit through early detection. However, results in this group of patients from magnetic resonance imaging (MRI) are encouraging [10,11]. The recent results of the Magnetic Resonance Imaging for Breast Screening study (MIRABS) in the UK have shown that MRI has much greater sensitivity than mammography, particularly in carriers of the BRCA1 susceptibility gene [12].

For population screening in women over 50 years of age, X-ray mammography remains the technique of choice. In the next few years the potential benefits of FFDM will be applied to screening as this technology inevitably becomes the X-ray mammography method of choice. Supplementing mammography with ultrasound in women with dense breast will improve sensitivity, particularly for small cancers, but with significantly reduced positive predictive value and specificity. Women offered screening with ultrasound, whether as a primary technique or as a supplement, must be fully informed of the risks of false positive findings as well as any likely benefits. MRI is emerging as the technique of choice for imaging younger women at increased risk, but it is unlikely to be considered cost-effective for population screening of those at 'normal' risk.

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