Clinical Radiology (1987) **38**, 215–216

Annotation: Population Screening by Mammography

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Opinions on the value of breast screening have always diverged, sometimes vehemently so, but in the recent past there has been a marked leaning towards the advantage of early diagnosis of breast cancer.

In 1966 Strax and Shapiro reported the results of the Health Insurance Plan of New York, demonstrating a reduction of mortality in the screened population of over 30% in women over 50, and this reduction has been maintained for more than 14 years (Shapiro *et al.*, 1982). Many studies have since been undertaken, but it was not until Tabar *et al.* in 1985, in a carefully conducted study from Falun, Sweden, reproduced similar results, with a one-third reduction in mortality in women of 50 years or older who had had their breast cancer detected by screening. Similar benefits have been demonstrated in Holland in the Nijmegen and Utrecht studies. The more recent trial by the Department of Health and Social Security (DHSS) in England is now coming to the end of its 7 year period, and results will shortly be published, and are expected to be equally encouraging.

There has been little change in prognosis in spite of many different forms of surgery; even the introduction of adjuvant chemotherapy and treatment by radiotherapy has resulted in no substantial change in prognosis. Over 13500 women each year die as a result of breast cancer in this country with a mortality rate of 338 per 100000, the highest in the world (OPCS Monitor, 1986). This number is rising, as in the rest of Europe and America. A one-third reduction in mortality is therefore highly desirable.

Another great advantage of early detection is the possibility of limited surgery on the small cancers. The impact of a total mastectomy can be devastating to many women, and since the great majority of tumours in any of the reported screening series are under 2 cm in size, and a significant proportion are less than 1 cm, segmental resection or lumpectomy is often feasible. This means a shorter hospital admission, and less morbidity, with much less family strain. Finally, the reassurance side of breast screening must not be forgotten – women attend a screening clinic to be told they have not got cancer, and fortunately most get this comfort.

The benefits of early detection are not without some risks however. The problem of radiation induced cancer in the young radio-sensitive breast must always be remembered. There is no doubt that there is an increased risk of developing breast cancer after large doses of irradiation, as shown by the increased incidence in women exposed to irradiation from atomic fall out in Hiroshima and Nagasaki (Wanebo *et al.*, 1968) and in young women exposed to more than 90 cGy the incidence may be more than doubled. However, the irradiation from the atomic bomb was whole body irradiation, and consisted of a widely mixed spectrum. It is also interesting that the normal incidence in the Japanese women is very much lower than in England. The increased incidence was much higher in the young, and after 35 years of age was not significant.

A risk ratio for the over 35s has been calculated from radiation risk figures of the American Cancer Institute at 3.5 cancers per million women per rad (1 cGy) (Feig, 1983). The mean dose in a good system at present should be in the range of 2 milliseiverts per film, therefore the theoretical risk will be less than one per million women assuming a linear response to dose. The detection rate in a good system in the 35 and over age groups will be 5 per 1000, rising to 9 per 1000 in the over 50s – so the benefit outweighs the risk.

The arguments for risk and benefit, and indeed for the whole of the breast screening concept stand or fall on the quality of the service. The recommendations of the Forrest Committee are eagerly awaited. The main problems appear to be not whether to screen but how, when, and how much it will cost. If breast screening is to retain credibility, it must be a first class service, with obsessional radiography and radiological reporting. False positives are just as important as false negatives. Ironically with a detection rate of 5 per 1000 women, a reporter would be 99.5% correct if every examination was called normal, and this would be better than the average overall diagnostic rate in any branch of medicine. However, the whole point of screening is to detect the true positive, 5 per 1000, carcinomata. Equally the biopsy rate resulting from screening must not rise too high. Most series claim a 1:1 or 2:1 benign to malignant ratio. The detection rate in the recent BCCDP series in America was extremely high, but at the cost of a 17% biopsy rate (Baker, 1982). This not only loads the hospital service, but must increase patient morbidity.

The recommendations of the European Group for Early Detection of Breast Cancer by Mammography are published in this issue, proposing the establishment of central reference centres prior to setting up a national screening service; even so the standard of the peripheral units must be very high.

The training of radiologists will be a major task. Good mammographers are scarce and still need a great deal of training. The excellent results of Tabár *et al.* (1985) were produced by two dedicated and highly skilled whole time radiologists who double-read each film. Similarly radiographers need very detailed training in order to produce the appropriate films. Many a cancer goes undetected if it is not on the film; it is interesting to note that in one particular centre, at which the author works, an average of 1.5 cm more of the breast is demonstrated on each film, compared with other units.

Compression provides the clue to most good

mammograms, and therefore apparatus must be very carefully designed to give maximum compression with minimum discomfort. The shape of the compression plate edges must be optimal, and foot controlled compression leaves both hands free for positioning. Grids, either moving, or the new 200 line stationary grids which can be used in a cassette, make a considerable improvement to detail in the dense breast. The increase in dosage (approximately double) will be compensated by improvements in films and screens. Double sided emulsion, and two screens, have been introduced, and certainly the latest film and screen combinations are very much faster, thus reducing the dose of radiation.

At what age should screening commence? This problem is partly dictated by finance, and partly by the radiation considerations. Most series claim maximum benefit after 50 years of age, but there is increasing evidence of the validity of screening from 35 years onwards, with base line films at 35, and annual screening after 40 years. High risk groups in the population may well need screening at an earlier age, with special consideration of anticipation in women with a direct family history.

As for how much it will cost, the finance of screening in this country will be calculated from the DHSS trial. In Falun the cost of screening, and subsequent examinations, operations and treatment has been calculated at £21450 per 1000 women, with the cost per detected cancer of just under £2000 (Tabár *et al.*, 1985). A one film examination has been costed at £15. In the present financial climate this would involve some sacrifice in other directions – but priorities must be established. With 8 million women in this country between 40 and 65 years, this would entail a cost of approximately £172 million. The cost of screening and the implications of training sufficient staff are formidable, but must be considered in relation to the much greater costs of diagnosis and treatment for advanced disease.

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Editorial note: Since this annotation was written the Forrest Committee has recommended that a National breast screening programme be established. This recommendation has been accepted by H.M. Government.