

High Detection Rate of Breast Cancer by Mass Screening Using Mammography in Japan

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A trial of mass screening for breast cancer using both mammography and physical examination (independently) was carried out in women over 50 years of age in Tokushima Prefecture. Breast cancer was detected in eight of a total of 950 examinees by mammography alone, and no cases of breast cancer were detected by physical examination. The detection rate of breast cancer was 0.84%, which is very much higher than that obtained by conventional mass screening using physical examination alone. The detection rate increased especially in the sixth and seventh decades of life. All eight detected breast cancers were in the early stage. Based on these results, it is recommended to employ mammography in breast cancer screening for asymptomatic women aged over 50 years.

Key words: Mass screening — Breast cancer — Mammography — Early detection — Detection rate

With regard to screening for breast cancer by physical examination in Japan, comparisons of the clinical stage and overall survival of patients with cancers detected by mass screening and those found in outpatient clinics show that there is almost no difference in overall survival between the screening group and the outpatient group despite the higher rate of early-stage breast cancer in the former group. Based on our results and many other reports,¹⁻⁵⁾ the possible reasons for this lack of a great difference may be summarized as follows: (1) the detection rate is a little less than 0.1%, and the rate of early-stage disease among cancers detected by mass screening is nearly 50%; (2) more than half of the patients with detected cancer were already aware of their lumps; (3) the quality of mass screening, especially the sensitivity, is low; and (4) it is difficult to detect non-palpable breast cancer. To overcome these deficiencies, the use of mammography in breast cancer screening has been suggested. We have recently carried out mass screening for breast cancer by using both mammography and physical examination in a community, and in this paper, we present the results.

Since 1992, a trial of mass screening for breast cancer using mammography has been carried out in Tokushima Prefecture as a model project of the Ministry of Health and Welfare of Japan. The subjects of mass screening were females, 30 years or older, notified of the availability of mass screening, with asymptomatic breasts and living in three communities (towns). In this screening,

personal interview to ascertain past history relevant to breast disease, physical examination and mammography were performed independently. Physical examination of the breasts was carried out in all the women, while mammography was, in principle, performed only for women aged 50 years or over without selection of subjects.

The mass screening by mammography was performed in a mass-screening bus equipped with a mammographic apparatus and was conducted for about 50 women per day for 10 days in one year. Findings were evaluated as being normal or abnormal based on the criteria reported previously.⁶⁾ Craniocaudal and mediolateral oblique imagings of the breast using two-view film mammography (Siemens Mammomat II) were performed, and the films were read independently by two surgeons. The two major evaluable characteristics in mammography are tumor masses and calcification. To assess the findings as benign or malignant, tumor masses were evaluated according to the shape, margin, density, size and location of the lesion, and associated findings such as skin changes and calcification. Calcification was evaluated according to the type, size, number, distribution and associated findings, such as tumor masses. We divided the mammographic findings into 5 grades for each of the two characteristics, e.g., grade 1: no finding, grade 2: benign, grade 3: benign, but malignancy not ruled out, grade 4: malignancy suspected, and grade 5: malignancy. Subjects showing grade 3 or more for the mammographic findings were recommended to undergo further detailed examination at Tokushima Health Screening Center and Tokushima University Hospital. Further examination consisted of film mam-

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mography, ultrasonography together with careful physical examination of the breasts, fine aspiration cytology, and if necessary, surgical biopsy.

“Breast cancer detected in mass screening” was defined as cases diagnosed within a year of the mass screening in which they had been judged as “positive.” The clinical stage and histological type of the detected breast cancers were based on “The General Rules for Clinical and Pathological Recording of Breast Cancer,” issued by the Japanese Breast Cancer Society.⁷⁾

The examinees in the screening using both mammography and physical examination numbered 950 during the 2 years, and had received no previous screening. Breast cancer was detected in eight cases by screening mammography. The rate of some abnormal findings was 43.6%, the rate of cases requiring further examination was 10.1%, the rate of surgical biopsy performed was 2.0%, and the detection rate of breast cancer was 0.84%. This frequency of breast cancer is very much higher than that found by conventional mass screening by physical examination alone. In regard to this high frequency of breast cancer in Japan, Koike *et al.*⁸⁾ reported that detection rate of breast cancer by the same methods was 0.85%, and Ohuchi *et al.*⁹⁾ reported a value of 0.31%. Considering that the subjects of our mass screening were asymptomatic

women, with the majority aged 50 years or over, this frequency is so high that the incidence of breast cancer which has been generally accepted to date must be reconsidered. A possible counterargument is that mass screening using mammography detects even latent lesions which are likely to be latent cancers in the future. In fact, the presence of latent cancer has been demonstrated in prostatic cancer¹⁰⁾ and thyroid cancer¹¹⁾ by mass screening. It seems quite likely that mass screening for breast cancer using mammography can detect such latent cancer. However, among the eight cases of breast cancer detected in the present mass screening, there were five cases of infiltrating ductal carcinoma, including two cases with microinvasive carcinoma. It is difficult to consider at least these five cases as breast cancer with a latent course, and these five cases alone correspond to a detection rate of 0.53%, which is about five times higher than the ca. 0.1% rate with conventional mass screening by physical examination. This 0.53% detection rate is about the same as the incidence of breast cancer in the United States and Europe,^{12, 13)} and is a surprisingly high figure. The reason for this high incidence may be that all the subjects were initial examinees, with the majority aged 50 years or over, and the existence of latent breast cancer may have to be recognized even in infiltrating

Table I. Breast Cancer Detection Rate as Function of Age Distribution

Age distribution	Mammography			
	Number of examinees (%)	Number of breast cancers	Detection rate (%)	(95% CI ^{a)})
30-39	55 (5.8)	0	0	
40-49	199 (20.9)	1	0.50	(0-1.48)
50-59	382 (40.2)	3	0.79	(0-1.67)
60-69	274 (28.8)	4	1.46	(0.04-2.88)
70-	40 (4.2)	0	0	
Total	950 (100)	8	0.84	(0.26-1.42)

a) CI: confidence interval.

Table II. Cases of Breast Cancer Detected by Mass Screening Using Mammography

Case No.	Age (yr)	Physical examination	Mammographic findings	Stage	Tumor size (cm)	Lymph node metastasis	Histological type
1	52	Non-palpable	Mass shadow	I	0.8	n (-)	Scirrhus
2	64	Non-palpable	Mass shadow	I	0.6	n (+)	Pap.tub.
3	64	Non-palpable	Microcalcification	0 (TIS)	-	-	DCIS ^{a)}
4	59	Non-palpable	Microcalcification	0 (TIS)	-	-	DCIS ^{a)}
5	63	Non-palpable	Mass shadow	0 (TIS)	1.6	-	DCIS
6	56	Non-palpable	Microcalcification	0 (TIS)	-	-	DCIS
7	60	Non-palpable	Microcalcification	0 (TIS)	-	-	DCIS
8	47	Non-palpable	Mass shadow	I	1.0	n (-)	Scirrhus

Scirrhus: scirrhus carcinoma; Pap. tub.: papillotubular carcinoma; DCIS: ductal carcinoma *in situ*.

a) Microinvasion (+).

ductal carcinoma of the breast. Furthermore, the detection rate of breast cancer as a function of age was reviewed (Table I). The detection rates of breast cancer according to age by mammography were 0.79% in the sixth decade of life, and 1.46% in the seventh decade. Thus, breast cancer was detected at a high rate by mass screening using mammography in subjects in the sixth and seventh decades of life, but the difference between them was not statistically significant.

Table II presents the data for the eight cases of breast cancer detected in this study. The clinical stages of the breast cancers detected by mammography were stage 0 in five cases and stage I, with a lesion of 1.0 cm or less, in three cases; thus, all eight cases were in the early stage of breast cancer. All eight cases underwent breast conservation therapy. These cases included one in the fifth decade of life, three in the sixth decade and four in the seventh decade. The above results of our study suggest that mass screening using mammography might be useful in detecting breast cancer in women aged from 50 to 69 years.

In the United States and Europe mass screening for breast cancer using mammography has reduced the mortality in the mass-screening group compared with the control group of women aged over 50 years. It has also been demonstrated that mass screening using mammography had a beneficial effect on survival.¹²⁻¹⁴⁾

On the basis of our results and other reports,^{9, 12-14)} as described above, mass screening using mammography is considered to be suitable for asymptomatic women aged 50 years or older in Japan as well as in the other countries, and so it should be employed for these subjects. We consider mammography alone may be sufficient for mass screening for breast cancer in these subjects.

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