
Prophylaxis and Early Detection for Breast Cancer

JMAJ 44(6): 250–254, 2001

Hiroki KOYAMA^{*1}, Hideo INAJI^{*2}, Kazuyoshi MOTOMURA^{*2},
Yoshifumi KOMOIKE^{*2} and Sachiko NAGUMO^{*3}

^{*1} *President, Osaka Medical Center for Cancer and Cardiovascular Diseases*

^{*2} *Department of Surgery, Osaka Medical Center for Cancer and Cardiovascular Diseases*

^{*3} *Department of Cytology, Osaka Medical Center for Cancer and Cardiovascular Diseases*

Abstract: Breast cancer is steadily increasing in number in Japan due to less child bearing, less breast-feeding, and more westernization of life style than ever. Cancer registration in Osaka reported the incidence of breast cancer in 1996 to 1998 to be 41.1/100,000, four-times higher than the value in 1966–1968. Avoiding overweight, animal fat intake and mental stresses is a basic and easy measure for prevention of breast cancer. A unique study performed in Japan shows that daily intake of 10 or more cups of green tea inhibits development of breast cancer. A large-scale study by National Surgical Adjuvant Breast and Bowel Project (NSABP) revealed that 5-year tamoxifen administration to high-risk women decreased the incidence of breast cancer to 1/2 of the value for control women. Early diagnosis of breast cancer is most effectively achieved by fine needle aspiration cytology if the tumor is palpable with joint work with capable cytologists. More recently, stereo-tactic biopsy devices are available for non-palpable lesions. Mammography is more frequently used in mass screening system though its essential merit is yet to be investigated.

Key words: Increased incidence of breast cancer;
Breast cancer prevention by drugs;
Cytological and histological examinations;
Breast cancer mass screening

Introduction

The steady increase in number of breast cancer patients in Japan is attributed to increased calorie intake, particularly that through animal fats. The advance of women in society due to

changes in social structure is also a notable cause for the increase. This paper analyses the increase of breast cancer and discusses the present situation and future prospect for the method of primary prevention and early diagnosis as secondary prevention.

This article is a revised English version of a paper originally published in the Journal of the Japan Medical Association (Vol. 125, No. 3, 2001, pages 312–315).

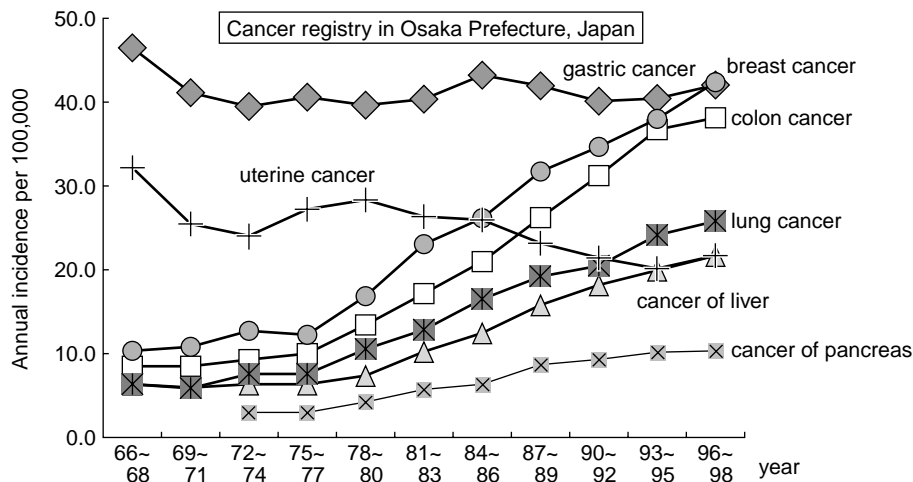


Fig. 1 Annual changes in the incidence of cancer (women)

Prevention of Breast Cancer

Fig. 1 shows the incidence of cancers in women in cancer-registry of Osaka Prefecture, Japan (the incidence of cancer per year per 100,000 population). It is clear from the figure that the incidence of breast cancer has increased by approximately four times during these 30 years (1966–1998) from 10.5 to 41.9. Such a tendency is observed worldwide, especially in developing countries, indicating the correlation between economic development and increased incidence of breast cancer.

When contemplating prevention of breast cancer, one merely has to consider the causes for its increase in recent years. Obesity is an important high risk factor for breast cancer as well as for cardiovascular diseases and colon cancer. Obesity control by proper diet and physical exercises is important for improving overall health as well as for breast cancer prevention. The incidence of breast cancer is higher in women who have had less childbirth, who are older at the first childbirth, and whose period of breast-feeding is shorter. This means that effective breast cancer prevention can be achieved if the conditions reverse to these are met. However, it is not appropriate to recommend them as preventive measures because of

various individual views about life and social conditions.

The Gail model¹⁾ proposes to comprehensively examine these risk factors and projects individualized probabilities of developing breast cancer. If the risk calculated by this method is high, it is necessary to take some concrete countermeasures.

The breast cancer preventive effect of polyphenol in green tea was recently reported. According to Fujiki,²⁾ daily intake of 10 or more cups of green tea delays the onset of breast cancer or restrains its recurrences.

A large-scale research (P-1 study) on prevention of breast cancer with drugs was conducted by National Surgical Adjuvant Breast and Bowel Project (NSABP).³⁾ This study randomized 13,388 women who were identified high risk for breast cancer by using the Gail model including the family history of breast cancer and the past history of mastopathy, into two groups; a group administered tamoxifen and a group given placebo for five years. It revealed that 5-year tamoxifen administration decreased the incidence of breast cancer to 1/2 of the value for control women (Fig. 2). The cost of tamoxifen administration for such preventive purpose, however, is not covered by the health insurance scheme in Japan.

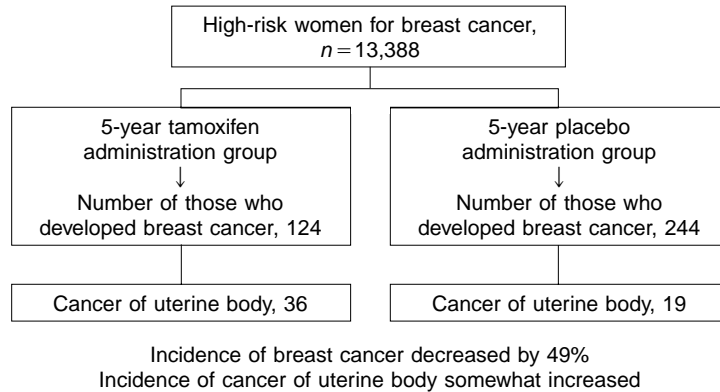


Fig. 2 Result of P-1 study by NSABP

Table 1 Result of Fine Needle Aspiration Cytology (Osaka Prefecture Adult Disease Center)

Pathological diagnosis	Year	No. of cases	Positive(%)	Suspectie(%)	Negative(%)	Indeterminable
Breast cancer	1965–1989	1,113	915 (82.2)	53 (4.8)	95 (8.5)	50
	1995	133	118 (88.7)	10 (7.5)	3 (2.3)	2
	1996	140	125 (89.3)	7 (5.0)	5 (3.6)	3
	1999	229	207 (90.4)	6 (2.6)	8 (3.5)	8
Benign lesion	1965–1989	827	41 (5)	50 (6.0)	641 (77.5)	95
	1995	54	0 (0)	3 (5.6)	45 (83.3)	6
	1996	57	0 (0)	9 (15.8)	44 (77.2)	4
	1999	74	1 (1.4)	4 (5.4)	65 (87.8)	4

Recent studies on families with high incidence of breast cancer identified BRCA 1 (17q) and BRCA 2 (13q) genes.⁴⁾ They are considered to be the breast cancer controlling genes, and the probability of developing breast cancer in women with mutations of these genes is said to be 50–70%. These people are recommended to undergo frequent screenings and receive prophylaxis administration. There is, however, less number of Japanese people with these gene abnormalities.

Early Detection of Breast Cancer

1. Palpation and diagnostic imaging

Since breast cancer develops in the organ located close to the body surface, patients themselves can easily palpate and detect it. However, a considerable skill is required to

establish diagnosis of breast cancer only by palpation. About 2/3 of outpatients requesting mammary examination do not have tumor and their main complaint is the tenderness in the mammary gland. Although such pain is usually caused by mastopathy, it is occasionally complicated by cancer, requiring careful palpation.

When tumor is suspected by palpation, the patient is given mammography or ultrasonography. Since those younger than 30 have ample mammary parenchyma, imaging of tumor by mammography is difficult. In such cases, ultrasonography is conducted first. In those older than 50, on the other hand, mammography is quite effective. Even when the tumor is non-palpable, if fine calciferous deposit is observed, this leads to the definite diagnosis of breast cancer, because the finding is quite unique to breast cancer.

Table 2 Merits and Demerits of Various Diagnostic Methods for Breast Cancer

Classification	Palpation	Mammography	Ultrasonography	Fine-needle aspiration cytology
Nature of lesion				
Large tumor	○	○	○	○
Small tumor	△	△	△	○
Non-palpable	×	△ (calcareous deposit)	×	×
Age				
Young (hard breast)	△	×-△	△	○
Older (soft breast)	○	○	○	○
Pathological type				
Diffuse type (papillary adenocarcinoma)	×	△	×	△
Localized type (medullar carcinoma of breast)	○	△	△	○
Infiltrating type (scirrhous carcinoma)	△	○	○	△

○ Highly useful △ Moderately useful × Not so useful

2. Cytological and histological examinations

Palpation and mammography, palpation and ultrasonography, or combination of these three techniques establishes the diagnosis of 80% of breast cancer. If it is still not possible to establish the diagnosis, fine needle aspiration cytology is performed. It is particularly effective for small size tumors as well as for confirming the benign nature of tumor. Table 1 shows annual changes in diagnoses established by needle aspiration cytology at the institute where the authors work. The institute uses needle aspiration cytology for establishing the diagnosis, and the Class V result is deemed as confirming the diagnosis of breast cancer. The problem arises when false positive diagnosis is made for pathologically benign lesions. Due to our continuing efforts to improve cytodagnosis, the number is approximating zero. Table 2 shows the characteristics, merits, and demerits of various diagnostic methods.

When cancer is suspected by diagnostic imaging but not confirmed by needle aspiration diagnosis, surgical biopsy is indicated. Of the two types of biopsies, incisional and excisional, excision is usually performed. When performing a biopsy, the patient should be offered sufficient information that an appropriate sur-

gery (mastectomy or lumpectomy) will be performed if the tumor is found to be malignant and obtain her consent in advance.

Core biopsy⁵⁾ or vacuum-assisted biopsy device⁶⁾ is often relied on in recent years instead of surgical biopsy. This technique consists of taking tissue samples of the size enabling histological examination by inserting a considerably thick needle of 12 to 14 gage into the lesion, and is expected to replace surgical biopsy. Presently, partial resection of the mammary gland (lumpectomy) is the mainstay of breast cancer operation, therefore a measure that obtains firm diagnosis with smaller invasion is being welcomed.

When the tumor is not palpable by palpation of the mammary gland, ultrasonography or mammography may detect a lesion. A cystic lesion, one type of mastopathy, may be clearly depicted by ultrasonography, enabling fine needle aspiration, core biopsy or vacuum-assisted biopsy guided by ultrasonography. When microcalcification deposits are observed by mammography, stereotactic imaging is performed to decide coordinates for the lesion, and cytological or histological samples are sampled. Alternatively, a hook wire may be inserted into the lesion and surgical biopsy

performed along the wire to establish the diagnosis.

3. Significance of breast cancer mass screening

Significance of mass screening of breast and other cancers is often discussed regarding its effectiveness or ineffectiveness. Since about 10 years previously, breast cancer mass screening has been performed mainly by palpation, combined by ultrasonography or mammography. The screening by Osaka Prefecture Government in which the authors participate, the subjects are limited to women over 35. The result for 1996–1998 screenings consisted of about 8% of 2,148,788 women over 35 undergoing screening, about 0.2% of those screened being found with breast cancer, and about 35% of the breast cancer being early stage cancer. The report⁷⁾ on data from Japan and abroad suggests the screening combined with mammography is more effective, promoting the mass screening system for breast cancer.

Conclusion

The advance of women into society in recent years is expected to increase the incidence of breast cancer due to less number of childbirth, higher nutrition intake, and increased stresses. Although it is still difficult to secure preven-

tion, the techniques for early detection are certainly making progress, enabling patient-friendly treatments such as lumpectomy.

REFERENCES

- 1) Gail, M.H., Brinton, L.A., Byar, D.P. *et al.*: Projecting individualized probabilities of developing breast cancer for white females who are being examined annually. *J Natl Cancer Inst* 1989; 81: 1879–1886.
- 2) Fujiki, H.: Two stages of cancer prevention with green tea. *J Cancer Res Clin Oncol* 1999; 125: 589–597.
- 3) Fisher, B., Costantino, J.P., Wickerham, D.L. *et al.*: Tamoxifen for prevention of breast cancer. Report of the National Surgical Adjuvant Breast and Bowel Project P-1 study. *J Natl Cancer Inst* 1998; 90: 1371–1388.
- 4) Miki, Y.: BRCA 1. *Nyugan no Rinsho*, 1997; 12: 306–313. (in Japanese)
- 5) Hayashi, T.: Diagnosis Stereo guide Core Biopsy. *Jap J Cancer Clinics* 2000; 46: 555–561. (in Japanese)
- 6) Gajdos, C., Levy, M., Herman, Z. *et al.*: Complete removal of nonpalpable breast malignancies with a stereotactic percutaneous vacuum-assisted biopsy instrument. *J Am Coll Surg* 1999; 189: 237–240.
- 7) Morimoto, T., Sasa, M., Yamaguchi, T. *et al.*: Effectiveness of mammographic screening for breast cancer in women aged over 50 years in Japan. *Jpn J Cancer Res* 1997; 88: 778–784.