Screening and Early Diagnosis of Breast Cancer

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Long-term survival in breast cancer currently rests on detection and appropriate therapy at the earliest possible stage, with survival being excellent in patients whose cancers are discovered at a small size and without dissemination. Discovery of lesions at the smallest possible size is therefore desirable.

Of the available imaging modalities, only modern mammography has been shown consistently to detect small breast lesions. The efficacy of screening mammography in asymptomatic women has been demonstrated in large-scale trials in women older than 49 years of age and has been strongly supported by follow-up results in the Breast Cancer Detection and Demonstration Project in women aged 40 to 50 years. Mammographic screening has been advocated by the American Cancer Society (ACS) beginning at 40 years of age, while the National Cancer Institute recommends mammographic screening beginning at 50 years of age.

The ACS recommends also that breast self-examination begin at 20 years of age. Unfortunately, a great majority of women do not practice breast self-examination, nor do they know that mammography is useful in detecting breast cancer. Further, only a minority of physicians recommend screening mammography, although most recommend breast self-examination and perform physical examination of the breast. Physicians are therefore urged to recommend regular screening to their patients.

For women, breast cancer remains the most prevalent cancer in America and is surpassed only by lung cancer as the leading cause of cancer death. It is estimated that in 1987 this disease will be diagnosed in 135,000 women and about 41,000 will die as result of it.[1] Unfortunately, the death rate has remained essentially unchanged for the past 50 years, whereas the overall incidence and prevalence has been increasing slowly.[2,3]

The means to prevent breast cancer has yet to be found, leaving improvement in diagnosis and therapy the only methods of decreasing the death and suffering associated with this devastating disease. Although over the past 20 years patients have been presenting with breast cancer earlier in the course of the disease,[4] the positive axillary lymph node rate has remained high, in the range of 40 to 55 percent.[5,6] Patients without positive regional lymph nodes or metastases have much better prospects for long-term survival than those having such lesions.[7,8] Specifically, ten-year survival in patients with minimal cancer (localized, invasive lesions of 0.5 cm or less in diameter or carcinomas in situ)[9,10] or "early" breast cancer (invasive tumors of 5 cm or less in diameter without axillary nodal or distant metastasis[7,11]) is approximately 92 to 95 percent[9] and 70 to 85 percent,[7,9] respectively, while the ten-year survival in more advanced disease is 40 percent or less.[7,8] Long-term survival or cure is therefore attainable only if methods for the earliest possible detection and diagnosis are developed, utilized, and followed by prompt, effective therapy.[7,11]

The following discussion will review pertinent aspects of the epidemiology, risk-factor assessment, pathology, screening guidelines, and patient and physician attitudes toward breast cancer screening.

RISK FACTORS

The general risk factors known for breast cancer are sex, age, and geography. It is well known that breast cancer is much more common in women than men,[1] with an incidence of less than 0.5 percent in the latter.[1,12] The incidence of breast cancer among American women increases sharply with age. Women aged 30 years have a

Submitted, revised, January 8, 1988.

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TABLE 1. BREAST CANCER INCIDENCE RATES BY AGE PER 100,000 POPULATION

Age (years)	Incidence per 100,000
25	<10
30	20
35	40
40	80
45	120
50	180
55	210
60	240
65	270
70	290
75	310
80	330

From Seidman and Mushinski[12]

rate of 20 per 100,000 while women aged 40 to 50 years have rates of 80 and 180 per 100,000.[12] Thereafter the incidence increases at a slower rate[12] (Table 1).

Marked differences exist in the incidence of breast cancer worldwide, with the highest rates in North America and northern Europe, intermediate rates in southern Europe and South America, and the lowest rates in Asia and black Africa.[13] Further, in low-incidence areas such as Japan, the rate actually declines postmenopausally.[14] Although genetic factors may have some role, environmental factors appear to predominate,[14] as illustrated by breast cancer rates in Japanese immigrants to the United States. The immigrant group developed disease at rates similar to the low levels found in Japan[15]; however, first-generation offspring demonstrated higher rates, and second and third generations attained an incidence similar to the general American population.[16]

Discussions of breast cancer risk factors generally involve an estimate or calculation of the relative risk of women developing breast cancer when these women manifest the specific risk factor. These relative risks are usually derived by comparing the breast cancer rates of women with the risk factor with the rates of women in a specific base or control population.[17–19] Cancer risk in these control or reference groups is usually on the order of 2 to 4 percent,[17–19] a rate considerably less than the cumulative lifetime risk of 9 percent now calculated for the overall American female population.[12,19] This 9 percent figure includes all women and thus encompasses all risk groups.[19] Because baseline risks used in many studies are often for specified periods, such as 20 to 30 years, and in women who have not completed their life span[17,18] when a relative risk is stated, it must be used only in the context of the referenced study. For example, if the control population cancer risk is 2 percent, then a two times relative risk would be 4 percent. A second method in general use is to state risk compared with similarly aged controls.

Several subgroups have been identified who are at increased risk of developing breast cancer. Women with a family history of breast cancer carry an overall relative risk estimated to be about two to three times that of similarly aged women in the general population.[14,20] Further, Anderson[18,21–23] has shown that age, kinship, and laterality have considerable value in estimating risk. For a patient whose mother and sister have had premenopausal bilateral breast cancer, there is about a 30 percent lifetime risk of breast cancer.[18] Cancer development also is seen at earlier ages than the general population in these familial groups.[18] If the cancer is found postmenopausally and unilaterally, the relative risk in a first-degree relative is 1.2, only slightly higher than the 2.3 percent rate in the control group.[18,23] These and other studies suggest hereditary factors are important in premenopausal breast cancer,[22,24] while hereditary factors are thought to have a lesser role in postmenopausal disease with environmental factors predominating.[12]

Women with previous breast cancer, either invasive or in situ, are at increased risk. If the patient has had invasive breast cancer, the risk in the contralateral breast is about four to five times the risk of women of comparable age in the general population.[14,25,26] Women with carcinoma in situ can be separated into two groups: those with lobular carcinoma in situ (LCIS), and those with intraductal carcinoma in situ (IDCS). These groupings are based on differences in tumor pathology as well as differences in tumor behavior. Lobular carcinoma in situ is considered a preinvasive lesion, characteristically being multicentric and bilateral.[27,28] Twenty-five to 33 percent of women with LCIS will develop invasive cancer with an equal chance of occurrence in either breast.[28] Development may occur many years after the initial diagnosis, with 50 percent occurring after 15 years and 38 percent after 20 years.[27,28] Patients with biopsy-proven IDCS have about a 40 percent chance of developing invasive breast cancer.[29,30] These cancers are located predominantly in the quadrant of the initial biopsy, with an average latent period prior to diagnosis of about ten years.[29,31] IDCS lesions are often multicentric and predominantly unilateral.[29,30]

Another important risk factor is proliferative epithelial breast disease as demonstrated by biopsy.[3,17] A large retrospective study by Dupont and Page[17] found that women with atypical lobular or atypical ductal hyperplasia and women with atypical hyperplasia and a family history of breast cancer had about five times and 11 times, respectively, the risk of women with nonproliferative disease. Specifically, women with atypical hyperplasia and women with atypical hyperplasia and a family history of breast cancer had a 10 percent and 20 percent incidence, respectively, of cancer 15 years after biopsy, while women with biopsy-proven nonproliferative lesion had only a 2 percent incidence over the same period.[17]

The presence of one or more of the foregoing risk factors

generally places the women who manifest them into the major- or high-risk category requiring regular follow-up with physical breast examination and mammography beginning at the time of the appearance or discovery of the factor.[19] Additionally, there are many other factors that have shown clinical or statistical association with breast cancer. Among these factors are first pregnancy after 30 years of age, menarche prior to 12 years of age, menopause after 50 years of age, history of benign breast disease, obesity, high socioeconomic status, and a history of ovarian or endometrial cancer.[3,14,25,32] The importance of these and other factors, either alone or in combination, is somewhat controversial. Epidemiologic reviews by Kelsey[20] and Schottenfeld and Fraumeni[3] as well as evaluation of risk factors by Martin,[25] Schwartz,[19] Seidman et al,[32] and Carter et al[33] arrived at variable conclusions concerning the degree of risk that these factors represent as well as their significance. Seidman and associates[32] evaluated risk factors in 365,000 women, accounting for presumed breast cancer causes in only 25 percent of cases. Further, Schwartz[19] believes that although these so-called minor factors should not be disregarded, women so identified should not be placed in a follow-up category separate from women without risk factors. There are studies that have included several of these factors and have suggested that by using various forms of risk-factor analysis, groups at significant risk could be identified in which up to 80 percent of cancers could be expected to develop.[33,34] Clarification of these issues awaits further studies.

BREAST CANCER PATHOLOGY AND BIOLOGY

Breast carcinoma cell type and degree of cellular anaplasia have been shown to have considerable bearing on survival.[9,10,26] For example, in similarly staged lesions, invasive duct-cell carcinoma (the most common breast cancer type) and invasive lobular carcinoma have poor prognoses, while medullary and mucinous carcinomas have considerably better long-term prognoses.[10,25] Additionally, the more anaplastic the tumor cells, the poorer the prognosis.[9,10]

The growth of breast cancer is a complex process depending on multiple factors. Experimental evidence and pathologic studies indicate that initially neoplasms grow by nutrient diffusion into spheriods of about 1 to 5 mm in diameter, where a stable state of cell renewal and cell death is established.[35,36] At this stage the tumors may remain small, in situ-type lesions. If the tumor can induce vascularization, however, then further local growth becomes possible.[37,38] Tumor vascularization creates a path for vascular and lymphatic channel invasion. The intravasation of tumor cells into these channels and their subsequent embolization transforms a local process into a potentially devastating systemic disease.[37–40] It is this systemic dissemination that is the overriding factor in breast cancer prognosis.[39–42]

While, in general, increasing primary tumor size correlates with increasing likelihood of metastasis,[43] the absolute size at dissemination is difficult to determine in breast cancer. Spread to regional lymph nodes and other distant sites can be found with duct-cell cancers as small as 2.6 mm, while others, such as medullary carcinoma, may be several centimeters in size without metastasis.[44] The majority of breast cancers are slow growing, achieving a palpable size after many years.[44] Using an average doubling time of 100 days, Gullino[37] calculated that a lesion would attain a diameter of 5.0 mm in nine years and about 20.0 mm in 11 years. The latter size is similar to that found by Foster and associates,[45] as well as Dowle and associates,[6] when results were tabulated of the size of the lesions discovered by patients utilizing breast self-examination. Unfortunately, carcinomas found by palpation have positive axillary node rates of between 40 and 55 percent,[5,6,11] while mammographically detected nonpalpable breast cancers have positive lymph node rates of between 13 and 20 percent.[46–48] Mammographically detected nonpalpable cancers in the 4- to 5-mm diameter range are quite common,[44,46] with 2- to 2.5-mm lesions at the threshold of mammographic detectability.[44,49] When the lower limits of size for lesions discovered during breast self-examination and screening mammography are compared, it becomes apparent that for most lesions there is an interval during which the lesion may be detected by mammography prior to palpation. In the example from Gullino,[37] the interval, or window, would be about two years. Of course, this window depends on many variables other than size. For example, lesions that are superficial in fatty breasts may be more easily palpable at a smaller size, whereas lesions deep in large breasts may not be palpable until larger than 2 cm.

DETECTION METHODS

The principal methods for detection of breast lesions are routine physician examination, breast self-examination, and diagnostic imaging.[5,47] The great majority of breast lesions are found by the patient,[47] while the remainder are discovered by either physician examination, diagnostic imaging, or a combination of the two methods.[48]

Breast lesions discovered by physicians during breast examination constitute a minority of breast cancers.[45] Greenwald and associates[50] reported a 10 percent breast cancer discovery rate by routine physician examination. This finding is similar to the 8.7 percent discovery rate by physical examination alone in the Breast Cancer

Detection Demonstration Project (BCDDP).[48] In the BCDDP, however, almost one half of breast cancers were found using a combination of physical examination and mammography. Unfortunately, 5 to 10 percent of palpable lesions are not seen at mammography[48,51]; therefore, mammography and physical examinations should be considered complementary, not competing, techniques.[52]

The goal of regular breast self-examination is to discover breast lesions at the smallest possible palpable size, as the likelihood of spread to axillary nodes and beyond generally increases with increase in primary tumor size.[43] Retrospective and prospective studies have demonstrated that women who practice regular breast self-examination find breast lesions at smaller sizes than women who do not practice breast self-examination.[6,45,50] Foster and associates[45] reported a mean tumor size of 2 cm and 3.5 cm, respectively, for women practicing monthly breast self-examination and those not practicing breast self-examination. Further, 40 percent of women performing regular breast self-examination and 57 percent of those not performing breast self-examination had positive axillary nodes on pathologic examination.[45]

Dowle and associates,[6] reporting preliminary results of the Nottingham Breast Self-examination Education Program, noted a decrease in median tumor size from 2.3 cm to 2.0 cm, respectively, when tumor size was compared in women who had attended breast self-examination educational sessions and in women not attending such sessions. Unfortunately, the lymph node involvement in both groups was not significantly different, 57 percent for the study group and 54 percent for the control group. Similar results for lymph node involvement were found by Saltzstein[5] when comparing a large unselected population with a historical control group after an extensive breast self-examination educational campaign in San Diego from 1977 through 1980. No significant difference in disseminated disease was found. Dowle et al[6] stated, however, that their results were preliminary and that follow-up might find differences in long-term survival. Greenwald and associates[50] were more optimistic in their assessment based on differences in staging of lesions discovered at breast self-examination as opposed to lesions found accidentally. They estimated that breast cancer mortality might be reduced by 19 to 24 percent by breast self-examination and routine physician examination. Conversely, Saltzstein[5] stated that, in large unselected populations, detection by palpation of lesions much smaller than a median size of 2.5 cm is unlikely.

It is apparent that breast self-examination does find lesions that are smaller and at an earlier stage than those found accidentally. Unfortunately, the generally accepted marker for dissemination, positive axillary lymph nodes, remains in about the 30 to 55 percent range for breast self-examination and routine physician examination.[5,6,45] Breast self-examination and routine physician examination, though not so effective as screening mammography for the detection of nondisseminated breast cancer, should be encouraged as means to detect lesions at the smallest possible size so as to discover the 5 to 10 percent of lesions that will not be seen at mammography, and to discover palpable interval cancers between mammographic screenings.[48,51]

Mammography helps to detect lesions by radiographic density differences (contrast) as well as radiographic patterns. In general, the greater the contrast, the more likely a lesion is to be seen. Wide variations in the radiographic density of women's breasts are seen due to differences in their breasts' ratios of fat to glandular tissue. Although not always the case, the ratio of fat to glandular tissue generally increases with age, with the radiodense glandular breast tissue of young women becoming more fatty and radiolucent with increasing age.[52] Therefore, mammograms in a woman aged 25 years would be expected to be radiodense and have little radiographic contrast between soft tissue lesions and surrounding glandular parenchyma, while mammograms in a woman aged 55 years would be expected to be more radiolucent and provide good radiographic contrast between soft tissue lesions and surrounding predominantly fatty parenchyma.

Unfortunately, even when lesions are well visualized, exact diagnoses are usually not possible because of the overlap in the radiographic appearance of benign and neoplastic lesions.[46,53] There are, however, radiographic criteria that, when present, make the radiographic diagnosis of breast cancer likely.[46,53] Cancers may be detected mammographically either directly as masses or indirectly as clustered microcalcifications, asymmetric opacities when compared with the contralateral breast, asymmetric ducts, areas of architectural distortion, or developing densities when compared with a previous mammogram.[46,53]

The detection of developing densities requires serial mammography.[25,44,46] The first or baseline screening mammogram of the series serves not only to detect abnormalities but also to establish a reference with which later mammograms can be compared for changes.[25,44] As the baseline mammogram is the initial step in a program of screening mammography, it should be obtained only in women for whom screening has been shown to be beneficial. For the asymptomatic, low-risk patient, analysis of the BCDDP data supports screening in women 35 years of age and older.[54] Mammography in younger, asymptomatic, low-risk women has no proven value.

Mammography is the only proven reliable method for both the diagnosis and screening of breast cancer.[51] Two types of mammographic technologies are currently in wide use, low-dose screen-film (LDSF) mammography and xeromammography. Modern LDSF mammography uses dedicated mammography systems and low-energy x-rays (26 to 32 kilovolt peak).[51,55] Radiation doses from these

units are considerably lower than those produced by high-dose plain-film mammography units used prior to the 1970s.[51] Xeroradiography requires specialized-imaging cassettes and developing equipment.[51,56] While these systems may have a dedicated x-ray source, a standard general purpose x-ray source can be used. Xeroradiography also uses considerably less radiation than do the older technologies, but more than LDSF mammography.[57] Haus,[57] utilizing a 5-cm-thick breast phantom, calculated the average glandular dose to the breast from a two-view mammogram for the LDSF mammographic and xeromammographic systems tested to be from 0.2 to 1.0 mGy (0.02 to 0.10 rad) and from 1.3 to 2.6 mGy (0.13 to 0.26 rad), respectively. The radiation doses from the xeromammographic systems were 1.3 to 13 times higher than those of the LDSF mammographic systems.[57]

Despite the significant decrease in radiation doses from modern mammographic systems, the question of unacceptable radiation risk from the use of mammography remains a concern not only for patients but for some physicians as well.[58,59] The National Cancer Institute, using a no-threshold, linear-extrapolation model, estimated that in women younger than 35 years an excess of 7.5 deaths per million per rad (10 mGy) would occur, while women older than 35 years would have 3.5 deaths per million per rad (10 mGy) dose.[60]

Extrapolation using this linear model and assuming a mortality of 50 percent and a dose of 3 mGy (0.3 rad), the expected excess mortality would be one death per 2 million for women over the age of 30 years.[61] Excess deaths for women older than 30 years would be less because of decreasing radiosensitivity with age, a ten-year or greater latent period for induction, and decreasing natural life expectancy in older women.[61] Law,[62] using an average breast dose of 2 mGy (0.2 rad) for the initial two films per breast examination, has estimated that for each radiation-induced cancer secondary to screening mammography, 170 cancers will be detected in women aged 40 to 49 years, and 1,000 cancers will be detected in women aged 60 to 64 years. A useful estimation of risk that patients might more easily understand has been made by Wilson,[63] who analyzed the daily risks of life. The risk of dying from radiation-induced breast cancer secondary to LDSF mammography is similar to the risk from accidental death when traveling 2,000 miles by jet passenger service or 600 miles by car. Indicated mammographic examinations do not carry undue radiation risk, while they detect many more cancers than they might initiate.

Women seeking medical attention for masses they have found themselves remain the largest indication for mammography, accounting for about 90 percent of examinations.[47,64] Mammography is also indicated in women with an asymmetric area of thickening in the breast, bloody or copious nipple discharge, skin or nipple retraction or dimpling, recent nipple inversion, frequent breast complaints for which a physician's advise is sought, or in patients who exhibit breast cancer phobia.[25] Mammography is rarely indicated in women aged less than 20 years.[56] Masses in this age group are usually fibroadenomas.[65] Persistent or worrisome masses in young women may be aspirated, excised, or examined by ultrasound.[51,55] If on the very rare occasion a cancer is clinically suspected in the young patient, preoperative mammograms should be obtained to exclude a synchronous cancer in the contralateral breast or multiple lesions in the ipsilateral breast.[55] If, on the other hand, a positive excisional biopsy has been performed without preoperative mammography, a delay of six to eight weeks is recommended prior to follow-up mammography to allow postsurgical changes to subside.[55]

Numerous diagnostic modalities other than mammography have been advocated for diagnostic and screening tests for breast disease. Ultrasound is one such modality. Ultrasound is used as an adjunct to mammography to evaluate the cystic or solid character of lesions.[64] Ultrasound is not recommended for screening purposes because of its limited ability to demonstrate lesions smaller than 1 cm in diameter or microcalcifications.[51,56,64] Thermography uses passive heat detection devices to record slight differences in tissue temperatures, but it remains an experimental device and has no proven value in screening for breast cancer.[66] Transillumination (light scanning), which uses transmitted infrared light detected by special video cameras to identify breast abnormalities, has no proven value in screening.[51,56] A recent large prospective study comparing light scanning with screening mammography found that light scanning was not competitive with mammography for breast screening. Further, no subpopulation was identified for which it was a useful adjunct to mammography.[67]

BREAST CANCER SCREENING

A substantial body of evidence has been amassed supporting the use of mammography in screening asymptomatic women.[48,54,68,69] The aim of screening is the detection of breast cancers prior to dissemination, allowing the treatment of early lesions for possible cure or for increased long-term survival. Benefits have been demonstrated by such studies as those sponsored by the Health Insurance Plan of Greater New York (HIP),[68] the Breast Cancer Detection and Demonstration Project (BCDDP),[48,54] and the Swedish National Board of Health and Welfare Breast Cancer Working Group.[69]

HIP enrolled 62,000 women aged 35 to 64 years in a controlled study during 1963 through 1970. Yearly mammography and physical examination were done in the screened group. The screened group had a 38 percent higher survival at five years and a 30 percent higher sur-

TABLE 2. BREAST CANCER SCREENING RECOMMENDATIONS

Procedure	American Cancer Society[59]		American College of Radiology[72]		National Cancer Institute[73]	
	Age (yr)	Frequency	Age (yr)	Frequency	Age (yr)	Frequency
Breast self-examination	>20	Monthly	>20	Monthly		
Breast physical examination	20–40 >40	Every 3 years Annual	>35	Annual	≥50	Annual
Mammography	35–40 40–49 ≥50	Baseline Every 1–2 years Annual	By 40 40–50 ≥50	Baseline Every 1–2 years Annual	≥50	Annual

vival from breast cancer at 10 and 14 years than the control group.[68]

The BCDDP was a joint project of the American Cancer Society and the National Cancer Institute, with 29 participating centers across the United States. The centers enrolled a total of 280,000 women aged 35 to 74 years, about one half of whom were aged less than 50 years. This uncontrolled study provided yearly mammography and physical examination over a period of five years from 1973 through 1981. The BCDDP demonstrated the utility of screening mammography for nonpalpable lesions. Thirty-six percent of all cancers, 50 percent of noninfiltrating cancers, 61 percent of lesions less than 1 cm, and 70 percent of carcinomas in situ were found by mammography alone. Eight of ten cancers were stage I, with 35 percent of these less than 1 cm.[48]

Follow-up studies began in 1980 on the 4,200 women with breast cancer.[54] The cumulative relative survival rates at five years in women less than 50 years of age and in women 50 years of age and over are very similar by stage and age when compared with the large breast cancer information database collected by the National Cancer Institute Surveillance, Epidemiology, and End Results (NCI SEER) program.[54,70] The overall survival ratios for invasive breast cancer in both age groups are considerably higher, however, in the BCDDP cancer patients when compared with the SEER program (1977–1978) patients, 88 percent vs 76 percent in the younger than 50-year-old groups and 87 percent vs 74 percent in the 50-year-old and older group.[54,70] The differences can be accounted for by a shift toward greater numbers of women with earlier stage disease in the screened population in the BCDDP when compared with general population patients in the SEER program.[54] Seidman and associates[54] concluded that although the BCDDP was not a controlled study, the similarities in gains in survival in the under- and over-50-year-old age groups when compared with the SEER program survival rates strongly support breast cancer screening in both age groups.

The seven-year Swedish study that ended in 1984 enrolled about 162,000 women.[69] They were randomly divided into two equal groups, with one group offered screening mammography and the other serving as a control group. Bilateral-mediolateral oblique views were obtained every two to three years. No physical examination was performed. A 25 percent reduction in stage II lesions at the end of the study was demonstrated when compared with the control group. Further, there was a 31 percent mortality reduction in the 50- to 74-year-old group when compared with controls.[69]

SCREENING RECOMMENDATIONS

With evidence of this type, the American Cancer Society (ACS),[59,71] the American College of Radiology (ACR),[72] and the National Cancer Institute (NCI)[73] have formulated slightly differing guidelines for breast cancer screening in asymptomatic women (Table 2). Moreover, women with a personal history of breast cancer should begin annual screening following diagnosis.[19,21] Physical examination every three months for the first one to two years and every six months thereafter is also recommended.[19,74] Women with LCIS and IDCS who have not undergone mastectomy should have close clinical follow-up and annual mammography.[19,27] Women with a family history of premenopausal breast cancer in a sister or mother should begin screening perhaps as early as their 20s.[25,55] Women with a biopsy-proven diagnosis of atypical epithelial hyperplasia are at high risk as well and should have annual screening mammography and physical examination from the point of diagnosis.[17]

PATIENT AND PHYSICIAN ATTITUDES

The effective use of regular physical examination, screening mammography, and monthly breast self-examination can have a significant impact on the detection and diagnosis of early breast cancer. To be effective, however, these methods must be applied widely. A 1979 NIH survey concerning women's attitudes toward breast cancer showed cancer (76 percent) and breast cancer (44 percent) in particular to be the leading health concern given by

respondents.[58] This same survey showed that only 29 percent of women respondents practiced monthly breast self-examination, although 96 percent had heard of the procedure. Only one in five women knew that mammography was useful in detecting breast cancer at an early stage.[58]

Further, a 1984 ACS survey on physicians' attitudes and practices in early cancer detection reported that only 11 percent of the primary care physicians surveyed observed the ACS guidelines on mammography despite a 41 percent agreement with the guidelines.[59] The remainder disagreed either partially or completely. The principal reasons cited for disagreement were that mammograms (1) are too expensive (39 percent), (2) are not necessary without symptoms (29 percent), (3) are not necessary annually (28 percent), and (4) result in too much radiation exposure (35 percent).

Although traditional diagnostic mammography is relatively expensive,[59] there are current mammographic screening programs in operation that cost $50 or less.[75,76] Studies that clearly demonstrate the increased survival from early detection of asymptomatic breast cancer directly refute the opinion that mammograms are "not necessary without symptoms."[48,69] Newer mammographic equipment causes far less radiation exposure than equipment that had been used previously,[61,77] and the radiation risk is well within acceptable limits.[62]

CONCLUSIONS

Although the most appropriate mammographic screening interval has yet to be defined, annual to biennial screening, depending on the woman's age, has been recommended to detect developing breast cancers as early as possible.[71-73] Early detection is especially important for tumors with short doubling times that might attain considerable size over a short interval and therefore have increased potential for metastasis.[44]

Detection of early cancer allows a choice among equally effective therapies.[4,78,79] The therapy of greatest recent interest has been conservative therapy (limited surgery followed by radiotherapy) and, where appropriate, chemotherapy.[78,79] In patients with amenable lesions, conservative therapy offers a breast-sparing procedure that may have psychological and cosmetic advantages.[4]

Adherence to the ACS guidelines or, as a minimum, the NCI guidelines will ensure considerable improvement in breast cancer mortality and morbidity.[7,71,73] To reach this goal, physicians must be aggressive in their approach to breast cancer screening. The importance of screening must be conveyed to the patient. Specific risk factors and their implications should be explained to the patient so that she understands her personal breast cancer risk. The importance of breast self-examination should be emphasized at every office visit regardless of the reason for patient contact. Just as important, physicians must discard their misgivings about screening mammography and offer it to their patients on a regular basis.

References

1. Silverberg E, Lubera J: Cancer statistics. CA 1987; 37:2–19
2. American Cancer Society: Cancer Facts and Figures, 1983. New York, American Cancer Society, 1983
3. Schottenfeld D, Fraumeni J Jr: Breast. In Schottenfeld D (ed): Cancer Epidemiology and Prevention. Philadelphia, WB Saunders, 1982, pp 855–870
4. Brady LW, Bedwinek JM, Loughead JR: Radiation therapy as primary treatment for cancer of the breast. In Amendola BE, Amendola MA (eds): Recent Trends in Radiation Oncology and Related Fields. New York, Elsevier, 1983, pp 221–247
5. Saltzstein SL: Potential limits of physical examination and breast self-examination in detecting small cancers of the breast. Cancer 1984; 54:1443–1446
6. Dowle CS, Mitchell A, Elston CW, et al: Preliminary results of the Nottingham breast self-examination education program. Br J Surg 1987; 4:217–219
7. Early detection of breast cancer: Council report. JAMA 1984; 252:3008–3011
8. Harris JR, Hellman S, Canellos GP, Fisher B: Cancer of the breast. In DeVita VT Jr, Hellman S, Rosenberg SA (eds): Cancer: Principles and Practice of Oncology, ed 2. Philadelphia, JB Lippincott, 1985, pp 1119–1177
9. Montague ED: Conservation surgery and radiation therapy in the treatment of operable breast cancer. Cancer 1984; 53:700–704
10. Gallager HS, Martin JE: An orientation to the concept of minimal breast cancer. Cancer 1971; 28:1505–1507
11. Lester RG: The contributions of radiology to the diagnosis, management, and cure of breast cancer. Radiology 1984; 151:1–7
12. Seidman H, Mushinski MH: Breast cancer incidence, mortality, survival, and prognosis. In Feig SA, McLelland R (eds): Breast Carcinoma; Current Diagnosis and Treatment. Chicago, Year Book Medical, 1983, pp 9–46
13. Waterhouse J, Muir C, Correa P, et al: Cancer Incidence in Five Continents. Vol III. Lyon, IRAC, 1976
14. Kelsey JL, Hildreth NG, Thompson WD: Epidemiologic aspects of breast cancer. Radiol Clin North Am 1983; 21:3–12
15. Haenszel C, Kurihara M: Studies of Japanese migrants. I. Mortality from cancer and other diseases among Japanese in the United States. J Natl Cancer Inst 1968; 40:43–68
16. Buell P: Changing incidence of breast cancer in Japanese-American women. J Natl Cancer Inst 1973; 51:1479–1483
17. DuPont WD, Page DL: Risk factors for breast cancer in women with proliferative breast disease. N Engl J Med 1985; 312:146–151
18. Anderson DE: Genetic study of breast cancer: Identification of a high-risk group. Cancer 1974; 34:1090–1097
19. Schwartz GF: Clinical implications of breast cancer risk factors. In Feig SA, McLelland R (eds): Breast Cancer: Current Diagnosis and Treatment. Chicago, Year Book Medical, 1983, pp 89–94
20. Kelsey JL: A review of the epidemlogy of human breast cancer. Epidemol Rev 1979; 1:74–109
21. Anderson DE: Breast cancer in families. Cancer 1977; 40:1855–1860
22. Anderson DE: Some characteristics of familial breast cancer. Cancer 1971; 28:1500–1504
23. Anderson DE: A genetic study of human breast cancer. J Natl Cancer Inst 1972; 48:1029–1034
24. Holm NV, Hauge M, Harvald B: Etiologic factors of breast cancer elucidated by a study of unselected twins. J Natl Cancer Inst 1980; 65:285–298
25. Martin JE: Indications for mammography. In Atlas of Mammography. Baltimore, Williams & Wilkins, 1982, pp 9–12

26. Frazier TG, Copeland EM, Galleger HS, et al: Prognosis and treatment in minimal breast cancer. Am J Surg 1977; 133:697–701
27. Frykberg ER, Santiago F, Betsill WL Jr, et al: Lobular carcinoma in situ of the breast. Surg Gynecol Obstet 1987; 164:285–301
28. Hutter RVP: The management of patients with lobular carcinoma in situ of the breast. Cancer 1984; 53:798–802
29. Betsill WL, Rosen PP, Lieberman PH, et al: Intraductal carcinoma: Long-term follow-up after treatment by biopsy alone. JAMA 1978; 239:1863–1867
30. Von Rueden DG, Wilson RE: Intraductal carcinoma of the breast. Surg Gynecol Obstet 1984; 158:105–111
31. Page DL, Dupont WD, Rogers LW, et al: Intraductal carcinoma of the breast. Cancer 1982; 49:751–758
32. Seidman H, Stellman SD, Mushinski MH: A different perspective on breast cancer risk factors: Some implications of nonattributable risk. CA 1982; 32:301–313
33. Carter AP, Thompson RS, Bourdeau RV, et al: A clinically effective breast cancer screening program can be cost-effective, too. Prev Med 1987; 16:19–34
34. Schechter MT, Miller AB, Baines CJ, et al: Selection of women at high risk of breast cancer for initial screening. J Chronic Dis 1986; 39:253–260
35. Folkman J, Hochberg M: Self-regulation of growth in three dimensions. J Exp Med 1973; 138:745–753
36. Gimbrone MA, Leapman RS, Cotran RS, Folkman J: Tumor dormancy in vivo by prevention of neovascularization. J Exp Med 1972; 136:261
37. Gullino PM: Natural history of breast cancer: Progression from hyperplasia to neoplasia as predicted by angiogenesis. Cancer Res 1975; 35:512–516
38. Butler TP, Gullino PM: Quantitation of cell shedding into efferent blood of mammary adenocarcinoma. Cancer 1977; 39:2697–2703
39. Ruiz U, Babeu S, Schwartz MS, et al: Blood vessel invasion and lymph node metastasis: Two factors affecting survival in breast cancer. Surgery 1973; 73:185–190
40. Martin SA, Perez-Reyes N, Mendelsohn G: Angioinvasion in breast carcinoma. An immunohistological study of factor VIII-related antigen. Cancer 1987; 59:1918–1922
41. Fisher B, Redmond C, Fisher ER, et al: The contribution of recent NSABP clinical trials of primary breast cancer therapy to an understanding of tumor biology—An overview of findings. Cancer 1980; 46:1009–1025
42. Tarin D: Biological and clinical studies relevant to metastasis of breast cancer. Cancer Metastasis Rev 1986; 5:95–108
43. Fisher B, Slack NH, Boiss ID, et al: Cancer of the breast: Size of neoplasm and prognosis. Cancer 1969; 24:1071–1080
44. Buchanan JB, Spartt JS, Heuser LS: Tumor growth, doubling times, and the inability of the radiologist to diagnose certain cancers. Radiol Clin North Am 1983; 21:115–126
45. Foster RS Jr, Lang SP, Costanza MC, et al: Breast self-examination practices and breast-cancer stage. N Engl J Med 1978; 299:265–270
46. Sickles EA: Mammographic features of 300 consecutive nonpalpable breast cancers. AJR 1986; 146:661–663
47. Strax P: Mass screening for control of breast cancer. Cancer 1984; 53:665–670
48. Baker LH: Breast cancer detection demonstration project: Five-year summary report. CA 1982; 32:194–225
49. Symmonds RE Jr, Roberts JW: Management of nonpalpable breast abnormalities. Ann Surg 1987; 205:520–528
50. Greenwald P, Nasca PC, Lawrence CE, et al: Estimated effect of breast self-examination and routine physician examinations on breast-cancer mortality. N Engl J Med 1978; 299:271–273
51. Kopans DB, Meyer JE, Sadowsky N: Breast imaging. N Engl J Med 1984; 310:960–967
52. Wolfe JN: Breast parenchymal patterns and their change with age. Radiology 1976; 121:545–552
53. Sadowsky N, Kopans DB: Breast cancer. Radiol Clin North Am 1983; 21:51–65
54. Seidman H, Gelb SK, Silverberg E, et al: Survival experience in the Breast Cancer Detection Demonstration Project. CA 1987; 37:258–290
55. Gisvold JJ: Film-screen mammography. Presented before the 86th Annual Meeting of The American Roentgen Ray Society, Washington, DC, April 13–18, 1986
56. Seymour EQ, Stanley JH: The current status of breast imaging. Am Surg 1985; 51:591–595
57. Haus AG: Recent advances in screen-film mammography. Radiol Clin North Am 1987; 25:913–928
58. Breast Cancer: A Measure of Progress in Public Understanding: Management Summary. National Institutes of Health (Bethesda, Md). DHHS publication No. (NIH) 84-2306. Government Printing Office, 1981
59. Survey of physicians' attitudes and practices in early cancer detection. CA 1985; 35:197–213
60. Upton AC, Beebe GW, Brown MJ, et al: Report of NCI ad hoc working group on the risks associated with mammography in mass screening for detection of breast cancer. J Natl Cancer Inst 1977; 59:481–493
61. Feig SA: Assessment of the hypothetical risk from mammography and evaluation of the potential benefit. Radiol Clin North Am 1983; 21:173–191
62. Law J: Cancers induced and cancers detected in a mammography screening programme. Br J Radiol 1987; 60:231–234
63. Wilson R: Analyzing the daily risks of life. Technol Rev, Feb 1979, pp 41–46
64. Martin JE: Breast imaging techniques—Mammography, ultrasonography, computed tomography, thermography, and transillumination. Radiol Clin North Am 1983; 21:149–153
65. Baker RR: Preoperative assessment of the patient with breast cancer. Surg Clin North Am 1984; 64:1039–1049
66. Kopans DB: 'Early' breast cancer detection using techniques other than mammography. AJR 1984; 143:465–468
67. Monsees B, Destouet JM, Totty WG: Light scanning versus mammography in breast cancer detection. Radiology 1987; 163: 463–465
68. Shapiro S, Venet W, Strax P, et al: Ten- to fourteen-year effect of screening of breast cancer mortality. J Natl Cancer Inst 1982; 69:349–355
69. Tabar L, Gad A, Holmberg LH, et al: Reduction in mortality from breast cancer after mass screening with mammography. Lancet 1985; 1:829–832
70. Sondik EJ, Young JL, Horm JW, et al: 1986 Annual Cancer Statistics Review. National Cancer Institute (Bethesda, Md). DHHS publication No. (NCI) 87-2789. Government Printing Office, 1986
71. Mammography 1982: A statement of the American Cancer Society. CA 1982; 32:227–230
72. American College of Radiology guidelines for mammography. ACR Bull 1982; 38:6–7
73. National Cancer Institute, National Institutes of Health/National Cancer Institute consensus development meeting on breast cancer screening: Issues and recommendations. J Natl Cancer Inst 1978; 60:1519–1521
74. Deckers PJ: Current strategies in operable breast cancer. Hosp Pract 1987; 22:41–49, 53–54, 59–68
75. McLelland R: Low-cost mass screening with mammography as a means of reducing overall mortality from breast cancer. Radiol Clin North Am 1987; 25:1007–1013
76. Sickles EA, Weber WN, Galvin HB, et al: Mammography screening: How to operate successfully at low cost. Radiology 1986; 160: 95–97
77. Feig SA: Radiation risk from mammography: Is it clinically significant? AJR 1984; 143:469–475
78. Veronesi U, Zucali R, Luini A: Local control and survival in early breast cancer: The Milan trial. Int J Radiat Oncol Biol Phys 1986; 12:717–720
79. Fisher B, Bauer M, Margolese R, et al: Five year results of a randomized clinical trial comparing mastectomy and segmental mastectomy with or without radiation in the treatment of breast cancer. N Engl J Med 1985; 312:655–673