

Does Increased Detection Account for the Rising Incidence of Breast Cancer?

ABSTRACT

Background: The incidence of breast cancer has been increasing over time in the United States.

Methods: To determine the role of screening in this increase, trends in the incidence of *in situ* and invasive carcinoma of the breast were evaluated using records of the metropolitan Atlanta SEER program between 1979 and 1986. From a sample of records, evidence of symptoms and mammographic screening prior to diagnosis was recorded.

Results: The average annual age-adjusted incidence of invasive disease rose 29 percent among Whites and 41 percent among Blacks. Incidence increased in all age groups. A trend towards earlier detection of invasive disease was found. Asymptomatic tumors accounted for only 40 percent of the increased incidence among whites and 25 percent of the increased incidence among blacks, with mammography as the principal contributing procedure.

Conclusions: These data suggest that increased detection accounts for some but not all of the rising incidence of breast cancer in the United States. (*Am J Public Health* 1991;81:462-465)

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Introduction

A rise in the incidence of breast cancer has been observed in the United States during the past decade.¹⁻⁵ In part, this phenomenon may be attributable to the increasing prevalence of suspected risk factors.⁶⁻¹¹ Alternatively, increased mammographic screening^{12,13} could have resulted in more complete recognition of disease. This study was undertaken to determine whether the trends in breast cancer incidence could be explained by increased screening.

Methods

Data for this study were collected by a population-based cancer registry that has been described elsewhere.¹⁴ Briefly, clinical and demographic data are collected on all new cases of cancer diagnosed among residents of five counties in metropolitan Atlanta. The majority of cases are identified from records at local hospitals, supplemented by case-finding from free-standing pathology laboratories, outpatient clinics, physicians' offices, and death certificates. The present study concerns all cases of *in situ* or invasive breast carcinoma first diagnosed among females between 1979 and 1986.

Race- and age-specific incidence rates of *in situ* and invasive breast cancer by stage were computed for each of four consecutive two-year time periods between 1979 and 1986, using population estimates derived by the US Bureau of the Census¹⁵ and the National Cancer Institute. The incidence rates were age-adjusted to the 1970 US population 20 years of age and older, and approximate 95 percent confidence intervals (CIs) were cal-

culated.¹⁶ Age-adjusted incidence rate ratios with corresponding approximate 95 percent CIs¹⁷ were calculated for each subsequent time period relative to 1979-80, and tests for trends over time were performed with Poisson regression.¹⁸

Probability samples of registry abstracts for patients with invasive disease (*n* = 100 Blacks, 100 Whites) in each of two time periods, 1979-80 and 1985-86, were also reviewed to characterize the process that led to cancer detection.

Results

The overall average annual age-adjusted incidence rates of both *in situ* and invasive breast cancer among Whites rose during this study (Figure 1). The climbing incidence of invasive malignancies, however, was confined to patients with localized disease at diagnosis. Among Blacks, no increase in the age-adjusted incidence rate of *in situ* breast carcinoma was observed until 1985-86 (Figure 2). The corresponding incidence of invasive breast cancer, in contrast, rose consistently over time. The increase in incidence occurred mainly in patients with localized disease, except for a climb in regional disease during the most recent time period.

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For both races, incidence rates increased temporally in each of the age groups 20–49, 50–64, and 65 or over. Tables detailing the changes in rates over time will be provided upon request.

Age-adjusted incidence rates of *in situ* breast cancer more than doubled among Blacks from 1979–80 to 1985–86 (rate ratio [RR] = 2.3), and more than tripled among Whites (RR = 3.7). This increase was greatest for those aged 50 or older among Whites, and among those within the age group 50–64 among Blacks. For invasive breast malignancies, the temporal trends in incidence were more homogeneous across age groups. Overall, the rate ratios over time, with 1979–80 as the reference period, were greater for Blacks (45 percent increase) than Whites (26 percent increase).

Review of records for a sample of patients with invasive malignancies revealed that the proportion of patients who were asymptomatic or without a recorded symptom increased to 10 percent of both White and Black patients (Table 1). The majority of these women were diagnosed with a mammogram, either with or without an accompanying physical examination. The proportion of patients who were symptomatic but who were also diagnosed with a mammogram rose to 32 percent among Whites and 15 percent among Blacks (Table 1). Among Blacks, the increasing use of mammography was evident among patients with localized disease, but not among those with more extensive disease at diagnosis (Table 2). Among Whites, however, a substantial increase in the use of mammography was observed in both localized and nonlocalized disease categories.

Among Whites, about 2 percent of invasive cancers diagnosed in 1979–80 were asymptomatic (Table 1). Multiplication of this percentage by the age-adjusted invasive incidence rate for that time period (119.5 per 100,000) yielded an estimate of the age-adjusted rate of asymptomatic cancers (viz., 2.4 per 100,000). The corresponding estimate for Whites during 1985–86 was 15.1 per 100,000, or 40.2 percent of the total increase in breast cancer occurrence between these two time periods. The corresponding percentage for Black women was 25.4 percent. By similar reasoning, asymptomatic tumors reported as mammographically detected accounted for an estimated 20.1 percent of the increase among Whites and 12.8 percent among Blacks.

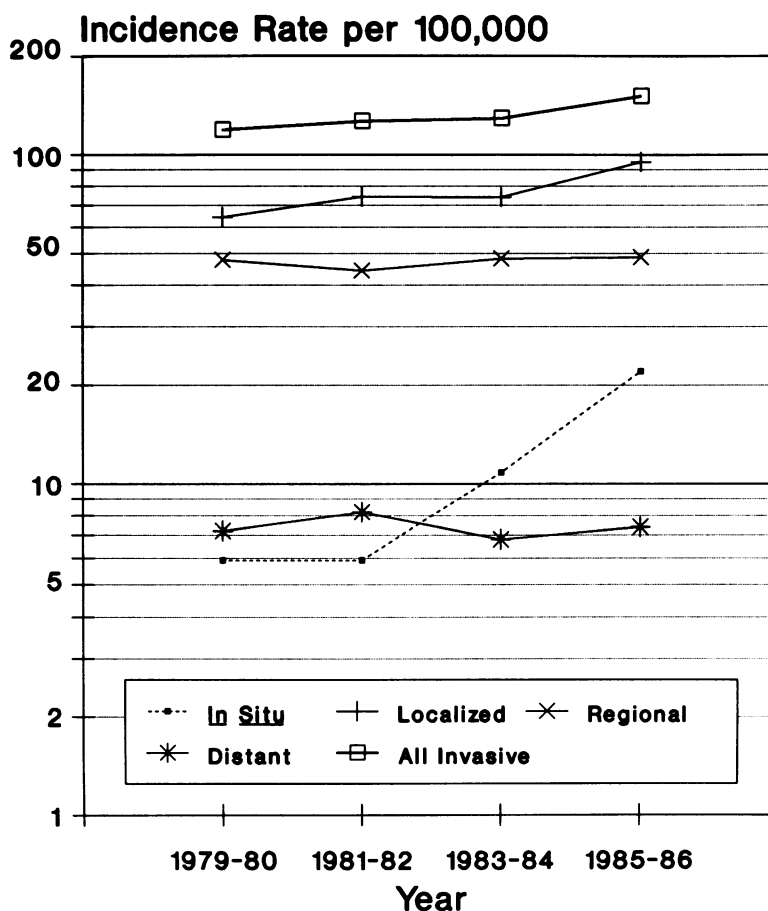


FIGURE 1—Trends over Time in Age-Adjusted Average Annual Incidence of Breast Carcinoma among White Women in Atlanta, by Stage.

TABLE 1—Percentage Distribution of Reported Detection Circumstances for Sampled Patients in Atlanta, Stratified by Race and Time Period of Diagnosis

Detection circumstances	White		Black	
	1979–80	1985–86	1979–80	1985–86
Symptoms Present				
Symptoms only	61	47	85	60
Physical examination	4	2	3	5
Mammography	16	29	4	15
Both examination and mammography	2	3	0	0
Other*	14	8	5	6
Symptoms Absent				
Physical examination	1	1	0	0
Mammography	1	5	0	4
Both examination and mammography	0	3	0	3
Other*	0	1	3	3
Symptom History Unknown	1	0	0	4
Total	100 (n = 100)	100 (n = 99†)	100 (n = 100)	100 (n = 99†)

*Detected during medical management of other conditions, such as back pain, gastroenteritis, diabetes mellitus, or benign breast disease.

†One medical record could not be located.

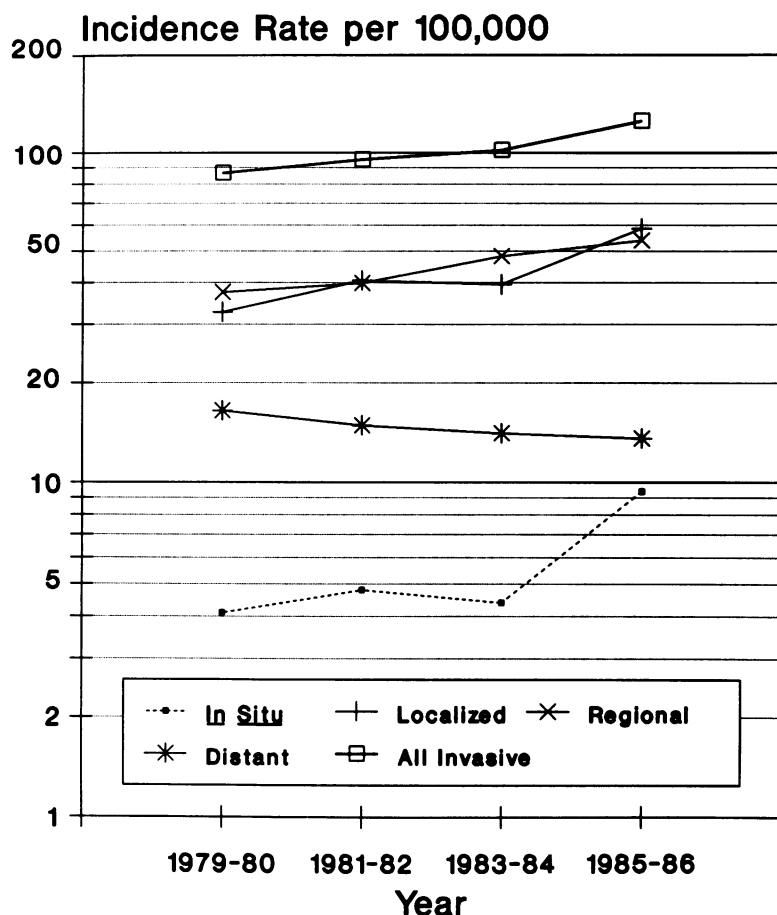


FIGURE 2—Trends over Time in Age-Adjusted Average Annual Incidence of Breast Carcinoma among Black Women in Atlanta, by Stage.

TABLE 2—Percentage Distribution of Reported Diagnostic Procedures and Stage for Sampled Patients in Atlanta, Stratified by Race and Time Period of Diagnosis

Diagnostic method	White		Black	
	1979-80	1985-86*	1979-80	1985-86*
Localized Stage				
Physical examination	3	1	2	2
Mammography	13	25	1	15
Both examination and mammogram	2	2	0	3
Neither	35	32	32	28
Nonlocalized Stage				
Physical examination	2	2	1	3
Mammography	4	12	3	4
Both examination and mammogram	0	1	0	0
Neither	41	24	61	44
Total	100	100	100	100
	(n = 100)	(n = 99*)	(n = 100)	(n = 99*)

*One medical record could not be located.

Discussion

The findings of increasing incidence rates of both *in situ* and invasive breast carcinoma in Atlanta are consistent with results from national surveillance data.⁴

Also in accord with national trends,⁴ among women with invasive malignancies, only those with localized disease demonstrated a substantial rise in incidence.

Although improvement in case ascertainment could produce an apparent rise in incidence, case ascertainment procedures did not change over time, and less than one percent of cases throughout this study were detected only from death certificates, suggesting virtually complete ascertainment at hospitals.

It has been shown that an increasing proportion of ductal carcinomas of the breast are detected by mammograms at the *in situ* stage.¹³ In principle, mammography could lead to the detection of invasive cancers that would not be recognized otherwise. In the present study, however, mammographic detection of asymptomatic lesions accounted for only 20-40 percent of rising incidence among Whites and only 13-25 percent among Blacks.

The impact of mammography on earlier diagnosis of breast cancer was evident, however. The proportion of localized invasive carcinomas rose among Whites and Blacks, and the sampled abstracts revealed shifts toward mammographic diagnoses for localized disease among both races. These findings are in agreement with the results of previous studies, which have shown smaller tumor size, fewer lymph node metastases,¹⁹ and earlier stage at diagnosis²⁰ among women with breast cancer detected by mammography screening.

Factors other than mammography could have contributed to the shift toward earlier stages of disease. In particular, heightened awareness of breast cancer^{4,21} and increasing practice of breast self-examination^{21,22} could result in earlier recognition of disease. Unfortunately, the medical records reviewed in this study did not include information on these health behaviors.

In summary, it does not appear that increased mammographic screening fully accounted for the rising incidence of breast cancer. Further work is needed to determine whether increasing prevalence of established risk factors or the emergence of new risk factors can be implicated. □

Acknowledgments

This work was supported by contract N01-CN-55429 from the National Cancer Institute. The authors express their appreciation to the hospitals and physicians who provided information for this study, as well as to the staff who collected, edited, and processed the data. Ms. Essie Mills assisted in the preparation of the manuscript.

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NIMH Fifth Annual Research Conference on Mental Disorders

The National Institute of Mental Health is planning a research conference on the classification, recognition and treatment of mental disorders in general health care settings serving children, adolescents, and adult patients. The conference, planned for September 23-24 in the Washington, DC vicinity, will be the fifth annual conference on this topic.

Research presentations are encouraged for special sessions on: 1) diagnosis and care of mental disorders in *special populations* (rural, minority, child/adolescent) who are served by general medical caregivers; and 2) *alcohol and substance use disorders* in general medical settings. Other topics of interest include:

- the classification and accuracy of mental and substance use disorder diagnoses;
- the recognition and management of mental and emotional disorders found in the chronically medical ill;
- the severely mentally ill in general health settings;

- effectiveness of pharmacologic, psychosocial or consultation-liaison services;
- patterns and outcomes of referral of general medical patients to mental health specialists.

Research treatment settings may include ambulatory primary care settings, medical/surgical inpatient services, nursing homes, and emergency wards.

Abstracts, due May 30, will be reviewed by a scientific advisory committee and NIMH staff. Priority will be given to abstracts on new, completed research. Work in progress with an expected completion date before the conference, and original reviews of the research literature, may also be submitted.

For further information or to request an abstract form, contact: Junius J. Gonzales, MD, or Kathryn Magruder, MPH, PhD, NIMH, Fifth annual Primary Care Research Conference, Room 18C13, 5600 Fishers Lane, Rockville, MD 20857; (301) 443-1330/3364.