A Comparison of Estrogen and Progesterone Receptors in Black and White Breast Cancer Patients

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Abstract: After standardization for age and menopausal status, the prevalence of estrogen receptor positivity among 88 White breast cancer patients was about .72 compared with a prevalence of about .54 among Black patients. The prevalence of progesterone receptor positivity was also higher among White than among Black patients, although the magnitude of the difference was smaller. These differences were unchanged after adjustment for tumor size and nodal and distant metastases in addition to age and menopausal status. (*Am J Public Health* 1987; 77:351–353.)

Introduction

The breast is the most common site of primary cancer in both Black and White women in the United States.[1,2] Although Black women have a lower risk of developing breast cancer than White women, the survival of Black women following diagnosis is worse than that of Whites.[2] When all stages are combined, White patients survive an average of 6.6 years following diagnosis whereas Black patients survive only about 3.7 years.[3] The presence of estrogen receptors is known to be prognostically favorable and at least three studies have found lower frequencies of estrogen receptor positivity of breast cancers among Blacks than among White breast cancer patients.[4–6] Thus, the lower prevalence of receptors among Black breast cancer patients suggests that their poorer prognosis may be, in part, a reflection of this biologic difference.[6]

The presence of progesterone receptors is also predictive of survival, but in none of the cited studies was the prevalence of progesterone positivity among Black breast cancer patients compared with that among White breast cancer patients. The purpose of this paper is to present results of our comparisons of estrogen as well as progesterone receptor positivity in Black with that in White breast cancer patients.

Methods

In this study, two White breast cancer cases were matched with each Black cancer case on age, within five years, and menopausal status. All breast cancer cases admitted to Birmingham's University Hospital from January 1, 1979 through April 30, 1984 were identified through review of discharge diagnoses and through the tumor registry. On the basis of their medical records, cases were excluded from the study if they had a history of previous malignancy, if sufficient pathologic information was not available because the initial diagnosis had been made at another institution, or if mental disability would have prevented obtaining an accurate history by a physician. Ultimately, 68 Black women with breast cancer were matched with 136 White cases. Analyses were restricted to the 46 Black and 88 White cases for whom estrogen receptor information was available or to the 44 Black and 88 White cases for whom progesterone receptor information was available.

For statistical efficiency, the original matched triplets were broken in the analysis and adjustment for the matching factors was accomplished by logistic analyses using 10 categories for age and two for menopausal status.[7] (Although not shown, results based on the Mantel-Haenszel procedures were similar to the results of logistic regression.) In subsequent analyses, we adjusted for menopausal status (two categories), tumor size (three categories), nodal metastases (present or absent), and distant metastases (present or absent), but in these analyses treated age as a continuous variable because of the modest number of subjects. If nodal or distant metastases were not documented in the medical record, they were assumed to be absent. Prevalence estimates are based on logistic regression results and have been standardized as suggested by Wilcosky,[8] using the combined population of Blacks and Whites as the standard. (Such standardized estimates represent average model-predicted prevalences for the standard population.[8]

Results

We classified estrogen receptor assay results as negative (<3 fmol/mg), borderline (3–10 fmol/mg), or positive (>10 fmol/mg). Results, presented in Tables 1 and 3, show a lower prevalence of positivity and a lower median receptor level (7.5) among Black breast cancer cases than among White cases (median = 36). To adjust for age and menopausal status using logistic regression, we combined the negative and borderline categories. The prevalence of receptor positivity among Whites, standardized for age and menopausal status, was .72 (approximate 95 per cent confidence limits from .63 to .81; Table 3). The corresponding prevalence for Blacks was .54 (approximate 95 per cent confidence limits from .40 to .67). After adjustment for age, menopausal status, tumor size, and nodal and distant metastases, the prevalence among Whites was .72 (approximate 95 per cent confidence limits from .63 to .81) and among Blacks was .53 (approximate 95 per cent confidence limits from .39 to .67). Thus, these data suggest that the prevalence of estrogen receptor positivity is, on average, about 40 per cent higher among Whites than among Blacks after standardization for age, menopausal status, tumor size, and metastases.

The pattern of progesterone receptor positivity, summarized in Tables 2 and 3, is similar to the pattern for estrogen receptor positivity. After categorizing women with levels less than 10 fmol/mg as receptor "negative" and other women as positive and standardizing for age and menopausal status, we found the prevalence of receptor positivity among Whites to be .72 (approximate 95 per cent confidence limits from .63 to .81) and that among Blacks to be .60 (approximate 95 per cent confidence limits from .46 to .74). After standardizing for age, menopausal status, tumor size, and metastases, the preva-

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TABLE 1—Distribution of Estrogen Receptor Positivity

	Negative	Borderline	Positive	Mean Level	Median Level
Blacks	17	6	23	48	7.5
Whites	17	6	65	101	36.0

TABLE 2—Distribution of Progesterone Receptor Positivity

	Negative	Borderline	Positive	Mean Level	Median Level
Blacks	13	6	25	48	22
Whites	19	4	65	70	33

TABLE 3—Adjusted Estimates from Logistic Model

	Odds Ratio+	95% CL	Prevalence Black p	Prevalence Black 95% CL	Prevalence White p	Prevalence White 95% CL	Prevalence Difference PD	Prevalence Difference 95% CL
Estrogen Receptors (Standardized for Age, Menopause)	2.4	(1.1, 25)	.54	(.40, .67)	.72	(.63, .81)	.18	(.01, .35)
Estrogen Receptors (Standardized for Age, MP, T, N, M)	2.5	(1.1, 28)	.53	(.39, .67)	.72	(.63, .81)	.19	(.02, .37)
Progesterone Receptors (Standardized for Age, MP)	1.8	(0.8, 4.2)	.60	(.46, .74)	.72	(.63, .81)	.12	(−.05, 29)
Progesterone Receptors (Standardized for MP, T, N, M)	2.0	(0.9, 4.5)	.58	(.43, .72)	.73	(.63, .82)	.15	(−.03, .33)

NOTE: P = prevalence; CL = 95% confidence limits; PD = prevalence difference;
MP = menopausal status, T = tumor size; N = lymph node metastases;
M = distant metatstases
\+ = The odds ratio estimates the odds that a White patient is receptor positive divided by the corresponding odds for a Black patient, adjusted for confounding.

lence among Whites was .73 (95 per cent confidence limits from .63 to .82) and among Blacks was .58 (95 per cent confidence limits from .43 to .72). Although confidence intervals for the difference in prevalence between Blacks and Whites overlap the null (Table 3), the data are most consistent with a 25 per cent higher prevalence of progesterone receptor positivity among Whites than among Blacks.

Discussion

Like earlier investigations, we found a lower prevalence of estrogen receptor positivity for Black breast cancer cases than for White cases.[4-6] We also found that progesterone receptor positivity is less prevalent among Black than among White patients. Moreover, the observed patterns are not easily ascribed to differences between Black and White patients with respect to age, menopausal status, tumor size, or nodal and distant metastases, since our findings were not changed by standardization for these factors.

Human breast cancer is well known to be hormone dependent and responsive to hormonal manipulation, and estrogen receptors are established predictors of the response to such endocrine manipulation. While approximately two-thirds of estrogen-receptor-positive tumors will respond, only 10 per cent of receptor negative tumors will respond to such therapy.[4,10] Furthermore, the presence or absence of estrogen receptors is an important prognostic factor independent of treatment,[9,11-14] possibly because of the lower histologic and higher nuclear grade and slower replication, on average, of estrogen positive tumors.[10,15] Progesterone receptors, found in about one-half to two-thirds of breast malignancies, are also thought to be a marker of a more highly differentiated cell. Consistent with this idea, progesterone receptor positivity appears to be associated with a better prognosis and response to therapy, and may prove to be an even better prognostic predictor than estrogen receptor positivity.[11,16] Estrogen receptor status may also predict the relapse pattern, a relation that underscores the prognostic and biologic importance of estrogen receptors.[17] Thus the poorer survival experienced by Blacks after diagnosis of breast cancer may be due to biologic differences in addition to differences in other identified prognostic factors such as age and delay in seeking treatment.[18,19]

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Johnson Foundation Issues Report on 4-Year Rural Infant Care Demonstration Program

The Robert Wood Johnson Foundation recently released its report that chronicles the four-year demonstration program to improve infant mortality rates in remote rural areas by extending perinatal care to underserved, high-risk populations in isolated areas. The report notes that these efforts have resulted in significant improvements in infant mortality in 32 target counties in nine states, reducing the annual infant mortality rate there by 2.7 deaths per 1000 live births.

During the Foundation's Rural Infant Care Program (RCIP), 10 medical colleges received grants of up to $700,000 each to develop regional systems of prenatal and perinatal care. RCIP actively involved the medical schools and their highly skilled obstetrical, perinatal, and pediatric services with state and local public health units responsible for outpatient care in the target counties. Projects also strengthened the underlying perinatal care network through education of health professionals and development of communication and transportation systems. The improved infant outcomes are associated with improvements in health care services, increased access, and high-quality prenatal care which included outreach, patient education, risk assessment, appropriate medical interventions, and follow-up care.

Copies of the *Rural Infant Care Program Special Report* (No. two/1986) may be obtained from the Robert Wood Johnson Foundation, P.O. Box 2316, Princeton, NJ 08543–2316.

Also available on short-term loan is an 11-minute *Rural Infant Care Program Documentary* film showing how three projects addressed teen pregnancy, access to prenatal care, and teen parenting skills. Specify either 16mm film, ¾ inch VHS, or ½ inch VHS.

Six supplements that complement the *RICP Special Report* are also available free. Please specify quantity wanted when ordering these reports from the Johnson Foundation:

- Improving the Perinatal Care Provided by Local Doctors and Hospitals
- Launching a Volunteer Outreach Program for Rural Teens
- Helping Teenagers Become Effective Parents
- Tackling the Problem of Teenage Pregnancy
- Advocacy for Perinatal Health
- Improving Medicaid Coverage of Pregnant Women and Infants