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Cancers in Women

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I. Impact of Cancer

In the United States, cancer is the second leading cause of death both among men and among women, following only deaths due to heart disease [1]. The estimated number of deaths due to cancer during 1998 exceeded 564,000, with more than 294,000 occurring among men and 270,000 among women. Cancer was the leading cause of death among women aged 35–74 years.

Although there are at least 40 forms of cancer, six sites accounted for more than 60% of all deaths due to cancer among American women: breast, lung, colorectum, cervix uteri, corpus uteri, and ovary (Table 67.1). It was estimated that during 1998, lung cancer would be the most frequent form of cancer death among American women, accounting for almost 25% of all their cancer deaths. It also was estimated that breast and colorectal cancers would account for 16% and 11% of cancer deaths among women, respectively. The same six cancers accounted for almost 67% of all newly-diagnosed cases, excluding the common superficial skin cancers that generally are caught early, are very treatable, and usually are nonfatal. By far the most commonly diagnosed cancer was breast cancer, which alone accounted for almost 30% of all cases. Lung and colorectal cancers each accounted for more than 10% of the cases.

Based on data from the Surveillance, Epidemiology, and End Results (SEER) program incidence files and the National Center for Health Statistics mortality files, the lifetime probability for an American woman of being diagnosed with any form of non-superficial skin cancer was estimated to be 38%, or almost 2 in 5 (Table 67.2) [2]. For the specific cancers, the lifetime risk of ever being diagnosed varied from 12.5% for breast cancer (or 1 in 8), to about 6% for lung or colorectal cancer, to less than 1% for invasive cervix uteri cancer. The lifetime risk of dying from any form of cancer was 20.5%, or 1 in 5, with the risks ranging from 4.5% for lung cancer to 0.3% for cervix uteri cancer.

II. Trends in Cancer Rates among American Women

Mortality rates, age-adjusted using the 1970 U.S. standard, varied considerably according to cancer, race, gender, and over time (Fig. 67.1). Rates spanning 1950–1954 through 1990–1994 and 1995 were available for the racial categories white and nonwhite, and since 1970–1974 specifically for blacks. Rates per 100,000 person-years for breast cancer have been relatively stable among white women, whereas rates have increased among nonwhites, surpassing those among whites very recently; rates were higher among blacks than nonwhites since at least 1970, and exceeded those among whites around 1980. In contrast, lung cancer rates in the past were lower than the breast cancer rates among all race/gender groups, but rapid increases have altered the picture. Over the entire time period, rates rose by about 600% among women, by 169% among white men, and by 302% among black men. Rates always were considerably higher among men than among women, and rates among men peaked during the 1980s. Increases among women occurred later but accelerated during the late 1960s through the late 1990s, with some hint of less rapid increases during the 1990s. Lung cancer rates in the 1950s were higher among whites than nonwhites; in recent years, there has been little difference in the

Table 67.1
Estimates of Cancer among American Women, 1998

Cancer	Numbers: Cases	Numbers: Deaths
All cancers[a]	600,700	270,600
Breast	178,700	43,500
Lung	80,100	67,000
Colorectum	67,000	28,600
Cervix uteri	13,700	4,900
Corpus uteri	36,100	6,300
Ovary	25,400	14,500

Data from [1].
[a]Excluding superficial skin cancers.

Table 67.2
Lifetime Risk (Percent) for American Women of Being Diagnosed with Cancer or Dying from Cancer

Cancer	Being diagnosed	Dying
All cancers[a]	38.0	20.5
Breast	12.5	3.4
Lung	5.6	4.5
Colorectum	5.6	2.5
Cervix uteri	0.8	0.3
Corpus uteri	2.7	0.5
Ovary	1.8	1.1

Data from [2].
[a]Excluding superficial skin cancers.

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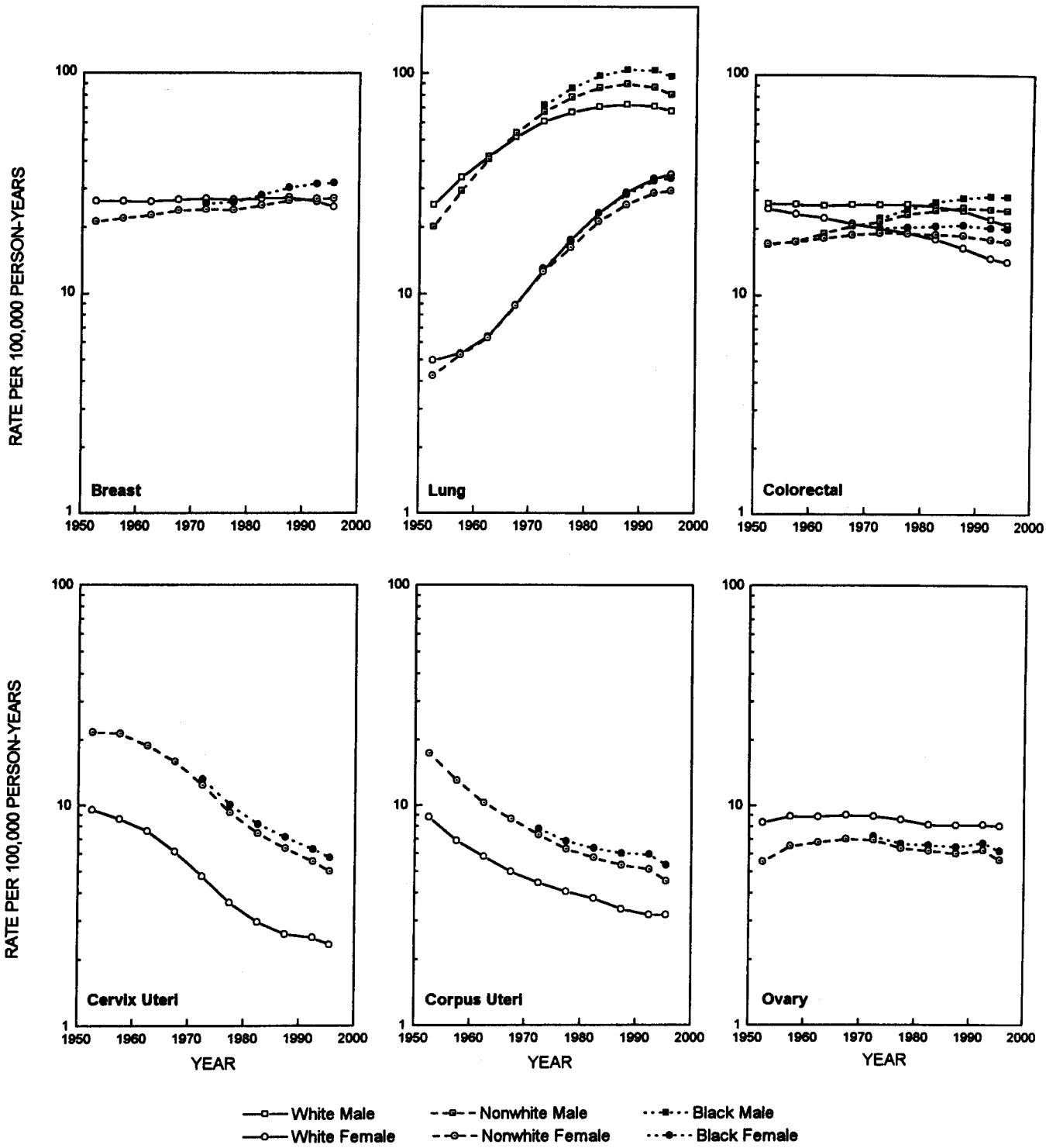

Fig. 67.1 Age-adjusted (1970 U.S. standard) mortality trends in the United States for six cancers by race and sex, 1950–1954 to 1990–1994, 1995.

rates for blacks and whites among women, in contrast to markedly higher rates for blacks among men. The trends for colorectal cancer have varied. Declines were consistent among white women but were apparent only recently among white men. Nonwhites showed early increases in colorectal cancer rates, but the increases were less rapid among women than among men, and the rates have plateaued in recent years. Rates for cancer of the cervix uteri declined more than 75%, and those for cancer of the

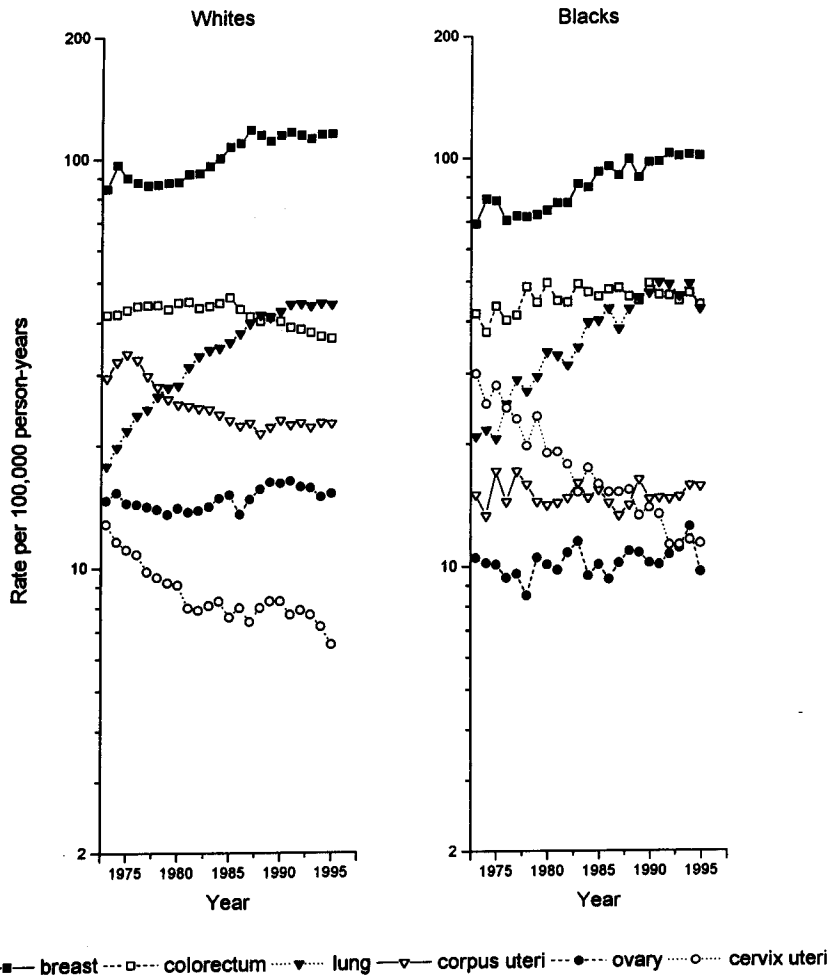

Fig. 67.2 Age-adjusted (1970 U.S. standard) incidence trends for six cancers among women by race, SEER program, 1973–1995.

corpus uteri (including cancer of the uterus not otherwise specified) declined more than 60%; rates were consistently higher among blacks and nonwhites than among whites. Ovarian cancer mortality rates did not change greatly over time, and rates among whites always were higher than those among nonwhites or blacks.

Incidence data based on newly-diagnosed cases are available since the early 1970s from nine population-based registries in five states and four metropolitan areas participating in the SEER program; about 10% of the U.S. population live in these areas [2]. Figure 67.2 presents the age-adjusted (1970 U.S. standard) incidence trends for the six common cancers among white and black women. The diagnosis of breast cancer rose in the early 1970s, which was coincident with the increased awareness and publicity associated with the diagnosis in the wives of the president and vice-president. Increases during the 1980s are largely attributable to the rising use of mammography and the detection of smaller tumors. As with the mortality data, lung cancer incidence rose rapidly among both races and surpassed colorectal cancer among whites in 1990. During the 1970s the incidence of corpus uteri cancer rose and subsequently fell in conjunction with the use of unopposed estrogens; decreases during the 1980s may be related to the rising use of opposed estrogens. Cervix uteri cancer incidence declined substantially among both races, which was related to the use of Pap smears for the detection of premalignant disease.

III. Racial/Ethnic Variation in Rates among American Women

Cancer mortality rates among women varied considerably according to racial/ethnic group (Table 67.3) [3]. Total cancer rates were highest among Alaska Natives, blacks, and Hawaiians, and were lowest among Filipinos, Hispanics, Chinese, and Japanese. Lung and colorectal cancer mortality rates also were highest among Alaska Natives; there were too few deaths to calculate rates for the other four cancers. Among the other racial/ethnic groups, black women had the highest mortality rates from breast, colorectal, and cervix uteri cancers, and the second highest rate for corpus uteri cancer. Non-Hispanic whites had the highest rate of ovarian cancer mortality and the second highest rate for breast, lung, and colorectal cancers. The second

Table 67.3
Racial/Ethnic Variation in Cancer Mortality Rates[a] among U.S. Women, 1988–1992

Cancer	All cancers	Breast	Lung	Colorectum	Cervix uteri	Corpus uteri	Ovary
Alaska Native	179	—	45.3	24.0	—	—	—
American Indian[b]	99	—	—	—	—	—	—
Black	168	31.4	31.5	20.4	6.7	6.0	6.6
Chinese	86	11.2	18.5	10.5	2.6	2.2	4.0
Filipino	63	11.9	10.0	5.8	2.4	1.3	3.4
Hawaiian	168	25.0	44.1	11.4	—	8.4	7.3
Japanese	88	12.5	12.9	12.3	1.5	1.9	5.0
White	140	27.0	31.9	15.3	2.5	3.2	8.1
Hispanic (Total)	85	15.0	10.8	8.3	3.4	2.3	4.8
White Hispanic	89	15.7	11.2	8.6	3.6	2.4	5.1
White Non-Hispanic	143	27.7	32.9	15.6	2.5	3.3	8.2

Note.—rate not calculated when fewer than 25 deaths. Data from [3].
[a]Per 100,000 woman-years, age-adjusted using the 1970 U.S. standard.
[b]New Mexico.

highest cervix uteri cancer rate occurred among white Hispanics. Hawaiian women experienced the highest mortality rate from lung and corpus uteri cancers. Rates for most cancers were low among Filipino women, although the lowest breast cancer rate was among Chinese women.

Cancer incidence patterns were somewhat different (Table 67.4). The rate for all cancers combined was highest among non-Hispanic whites, largely due to elevated breast cancer rates. Relative to non-Hispanic whites, Hispanic whites were at lower cancer risk overall and had the lowest rates for all of the cancers shown except for cervix uteri; invasive cervical cancer incidence among Hispanics was more than twice that among non-Hispanic whites. As in the mortality data, Alaska Natives and blacks had relatively high incidence overall because they had the highest rates of lung and colorectal cancers. Compared to whites, total incidence rates and rates for most cancers shown were considerably lower among the Chinese, Filipino, and Japanese, except for cancers of the colorectum among the Chinese- and Japanese, and cervix uteri among the Chinese and Filipinos. Rates among Hawaiian women were relatively high for cancers of the breast, lung, and especially corpus uteri. In addition to the racial/ethnic groups for whom mortality data were available, Vietnamese and Koreans are represented in the incidence data. Vietnamese women experienced relatively low rates of breast and corpus uteri cancers but they had the highest invasive cervix uteri cancer rate. The lowest total cancer incidence rates occurred among American Indians and Koreans and were related to their notably low breast and colorectal cancer rates.

IV. International Variation in Cancer Rates

International incidence data for 1988–1992 were available from the most recent volume of Cancer Incidence in Five Con-

Table 67.4
Racial/Ethnic Variation in Cancer Incidence Rates[a] among Women, SEER Program, 1988–1992

Cancer	All cancers	Breast	Lung	Colorectum	Cervix uteri	Corpus uteri	Ovary
Alaska Native	348	78.9	50.6	67.4	15.8	—	—
American Indian[b]	180	31.6	—	15.3	9.9	10.7	17.5
Black	326	95.4	44.2	45.5	13.2	14.4	10.2
Chinese	213	55.0	25.3	33.6	7.3	11.6	9.3
Filipino	224	73.1	17.5	20.9	9.6	12.1	10.2
Hawaiian	321	105.6	43.1	30.5	9.3	23.9	11.8
Japanese	241	82.3	15.2	39.5	5.8	14.5	10.1
Korean	180	28.5	16.0	21.9	15.2	3.8	7.0
Vietnamese	273	37.5	31.2	27.1	43.0	8.4	13.8
White	346	111.8	41.5	38.3	8.7	22.3	15.8
White Non-Hispanic	354	115.7	43.7	39.2	7.5	23.0	16.2
White Hispanic	256	73.5	20.4	25.9	17.1	14.5	12.1
Hispanic (Total)	243	69.8	19.5	24.7	16.2	13.7	11.4

Note.—rate not calculated when fewer than 25 cases. Data from [3].
[a]Per 100,000 woman-years, age-adjusted using the 1970 U.S. standard.
[b]New Mexico.

Table 67.5
International Variation in Cancer Incidence Rates among Women, 1988–1992

Cancer	All cancers	Breast	Lung	Colorectum	Cervix uteri	Corpus uteri	Ovary
United States							
U.S., Los Angeles: Hispanic White	199.4	57.4	14.5	18.2	17.9	11.5	9.0
U.S., SEER: White	280.9	90.7	33.8	29.5	7.5	18.2	11.9
U.S., SEER: Black	271.7	79.4	38.5	35.3	12.0	11.4	8.1
Asia							
China, Shanghai	153.2	26.5	18.2	18.1	3.3	3.7	5.8
India, Bombay	125.4	28.2	3.7	5.6	20.2	2.5	7.2
Israel: All Jews	239.3	77.4	9.2	31.3	5.3	10.8	11.6
Japan, Osaka	154.8	24.3	12.4	20.0	9.2	3.0	5.6
Europe							
Denmark	261.6	73.3	25.4	30.3	15.2	14.7	14.0
France, Calvados	195.9	76.3	4.6	24.2	10.4	8.4	9.0
Italy, Varese	226.5	73.5	8.5	26.9	6.4	12.6	10.2
Sweden	228.5	72.9	10.9	24.1	8.0	13.2	13.2
UK, England and Wales	225.5	68.8	22.8	23.7	12.5	8.7	12.4
Oceania							
Australia, New South Wales	240.9	67.2	14.9	30.9	9.9	8.8	8.4
New Zealand: Non-Maori	274.6	77.2	18.2	40.8	11.9	9.4	11.0

Note. Rates per 100,000 person-years, age-adjusted using world population standard. Data from [4].

tinents (Table 67.5) [4]. These rates were age-adjusted using the world standard, which has a relatively younger age distribution than the 1970 U.S. standard, so these rates are lower than those shown in Table 67.4. Among these 14 registries, the highest total cancer incidence occurred among U.S. SEER whites, followed by New Zealand non-Maoris and U.S. SEER blacks. The high U.S. rates were due to the high rates of breast and lung cancers, whereas colorectal cancer rates were notably elevated in New Zealand. The total cancer incidence among U.S. white Hispanics was relatively low; rates for most of the individual cancers also were low, except for cervix uteri cancer. Within Europe, the total cancer rate was highest in Denmark because of elevated rates of ovarian and corpus uteri cancers. The lowest rates were in Bombay, India (where the rates for all cancers except cervix uteri were low), in Shanghai, China (although the lung cancer rate there was among the top third), and in Osaka, Japan (where the lowest rates for breast and ovarian cancers occurred). From a different perspective, breast cancer rates were highest among U.S. whites and blacks (91 and 79 per 100,000 person-years, respectively), more than three times those in most of Asia. The high U.S. rates for lung cancer, exceeding 33, were more than eight times those in Bombay (3.7). The colorectal cancer rates in New Zealand and U.S. blacks (35–41) were about six times those in Bombay (5.6). Cervix uteri cancer rates in Bombay and U.S. Hispanic whites (18–20) were more than four times those in Shanghai (3.3). The corpus uteri cancer rates varied about sevenfold (from 2.5 to 18.2), and those for ovarian cancer more than twofold (from 5.6 to 14).

V. Age-Specific Cancer Rates among American Women

Age-specific mortality curves in the United States for these six cancers among white and black women during 1991–1995 are presented in Figure 67.3. Rates for all six cancers rose rapidly with age. Among women under age 50, breast cancer was the leading cause of cancer death. Lung cancer was the dominant form among women ages 55 to 80, and colorectal cancer predominated among the oldest women. Lung cancer mortality rates peaked among women in their 70s, reflecting the cohort-specific histories of cigarette smoking. Deaths due to uterine cancer were more likely cervical in origin among women under age 60 and corpus in origin at older ages.

Breast cancer was the most frequent form of cancer diagnosed across virtually the entire age range (Fig. 67.4). Only at the very young ages were ovarian and cervix uteri cancers more common. Cervix uteri cancer was unique in that incidence rates increase until about age 40 and then plateau thereafter, more convincingly among whites than among blacks. During the early 1990s, incidence rates both for lung cancer and for corpus uteri cancer peaked among women in their 70s. At the oldest ages, colorectal cancer was diagnosed as frequently as breast cancer.

Although difficult to discern from these figures, age-specific mortality and incidence rates were higher among blacks than among whites at virtually all ages for colorectal and cervix uteri cancers, and were higher among whites than among blacks for ovarian cancer [2]. Breast cancer incidence rates were higher among whites than among blacks only at ages 50 and older, in contrast to higher incidence rates among blacks at younger ages and higher mortality rates across virtually all ages. Corpus uteri cancer (including cancer of uterus not otherwise specified) mortality rates also were consistently higher among blacks than among whites, in contrast to higher incidence rates among whites. Lung cancer incidence and mortality rates were higher among blacks up to ages 65 or 70, with higher rates among whites at older ages.

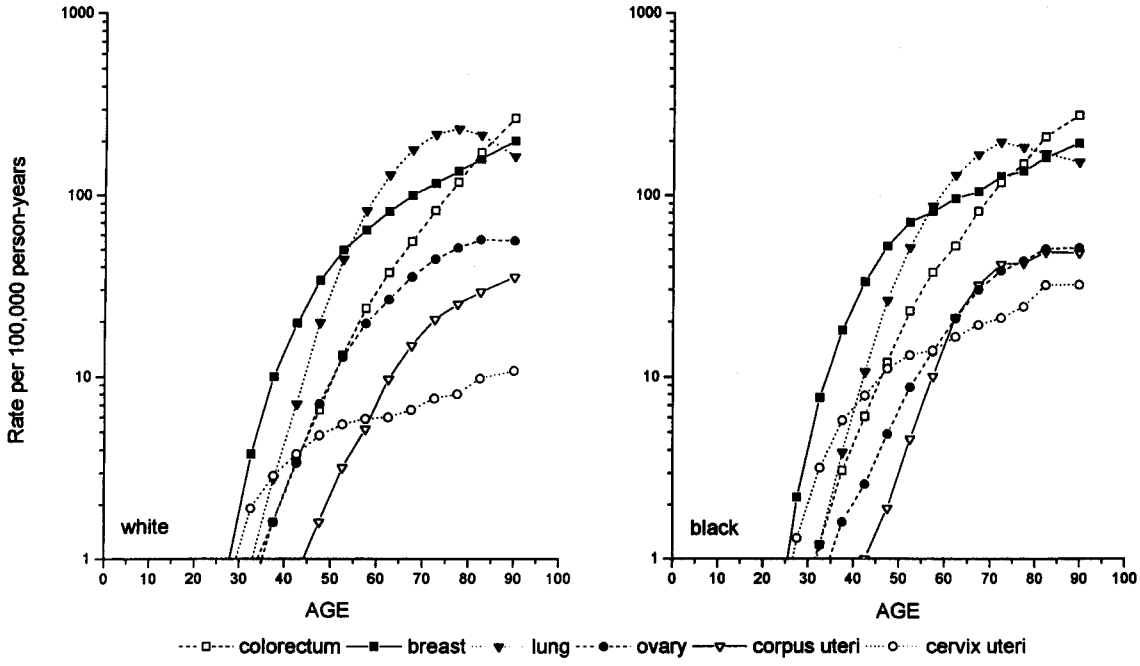

Fig. 67.3 Age-specific mortality curves in the United States for six cancers among white and black women, 1991–1995.

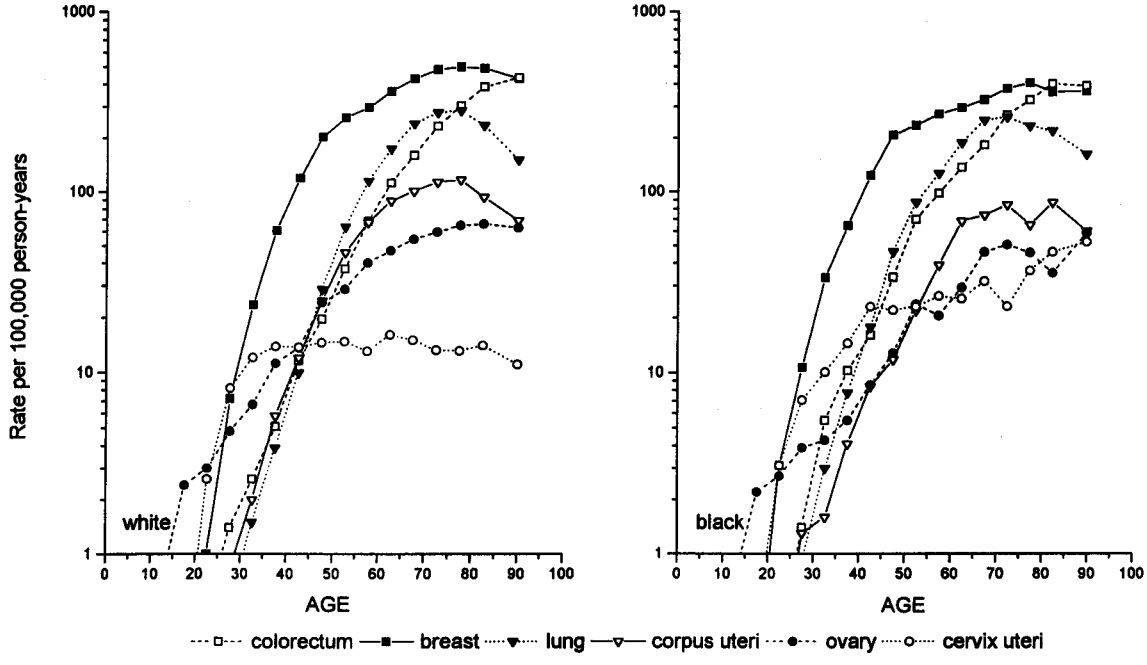

Fig. 67.4 Age-specific incidence curves for six cancers among white and black women, SEER program, 1991–1995.

VI. Stage at Diagnosis of Cancer and Patient Survival

Information regarding the stage of disease at the time of diagnosis is available from the SEER program [2]. During the early 1990s, more than 80% of lung cancers and about 90% or more of the five other cancers were staged (Table 67.6). More than half of ovarian cancers and lung cancers were not diagnosed until there was distant spread, with 24% or fewer diagnosed at a localized stage. In contrast, half or more of breast cancers and cervical cancers were diagnosed while still localized, at least among whites, and 10% or fewer had spread to distant sites. The largest proportion localized at diagnosis occurred for corpus

Table 67.6
Distribution of Major Cancers among Women by Stage at Diagnosis, SEER Program, 1989–1994

		%				
Cancer	Race	Total	Localized	Regional	Distant	Unstaged
Breast	White	100%	62	29	6	3
	Black	100%	50	35	9	5
Lung	White	100%	15	23	47	15
	Black	100%	12	24	52	12
Colorectum	White	100%	37	37	20	6
	Black	100%	32	35	25	7
Cervix uteri	White	100%	55	31	7	7
	Black	100%	43	37	10	11
Corpus uteri	White	100%	75	12	9	4
	Black	100%	50	22	20	8
Ovary	White	100%	24	9	61	6
	Black	100%	24	10	58	8

Data from [2].

uteri cancers among white women (75%), although the proportion was only 50% among blacks. The distribution was more even for colorectal cancers, with 32–37% each for localized and regional stages and about 20–25% for distant stage at diagnosis.

Five-year relative survival rates, adjusted for general population mortality experience, were highest among women with breast cancer and tended to be somewhat higher among whites than among blacks (Table 67.7). For all stages combined, the

Table 67.7
Five-Year Relative Survival Rates by Stage at Diagnosis among Women with Diagnoses of Cancer, SEER Program, 1989–1994

		%				
Cancer	Race	Total	Localized	Regional	Distant	Unstaged
Breast	White	86.7	98.1	78.3	23.2	52.2
	Black	70.6	88.9	62.4	14.4	47.3
Lung	White	14.5	50.8	20.5	2.1	7.6
	Black	11.2	43.6	15.2	2.2	8.3
Colorectum	White	63.0	92.5	66.7	8.6	34.6
	Black	52.5	83.8	61.2	6.5	37.0
Cervix uteri	White	71.5	92.5	49.4	12.9	60.9
	Black	59.0	85.5	38.0	8.2	65.9[†]
Corpus uteri	White	86.5	97.2	68.6	29.9	54.8
	Black	54.4	79.3	39.4	12.3	37.3[a]
Ovary	White	50.1	95.9	79.6	28.1	29.0
	Black	46.3	91.0	78.0[a]	24.3	33.2[b]

Data from [2].
[a]The standard error of the survival rate is between 5 and 10 percentage points.
[b]The standard error of the survival rate is greater than 10 percentage points.

largest differences were for patients with breast or corpus uteri cancer, with smaller but still notable differences for women with colorectal or cervical cancer. Racial differences for lung or ovarian cancer patients were minimal, even though the overall survival rate was 46–50% for ovarian cancer and less than 15% for lung cancer. Survival rates varied substantially by stage at diagnosis, from 80% or greater for all the localized cancers shown except lung cancer to less than 30% for those with distant disease. Only about half of patients diagnosed with localized lung cancer survived 5 years, and the rate declined to 2% for those with distant disease. Although the racial differences in stage-specific survival rates tended to be smaller than those for all stages combined, blacks still generally had a less favorable prognosis than whites. The more advanced stages at diagnosis and poorer survival rates within stage contributed to the higher mortality rates for breast and corpus uteri cancers among blacks versus whites, in the face of lower incidence rates.

VII. Conclusions

Although cancers at various anatomic sites share the common characteristics of malignant behavior, including uncontrolled proliferation and invasion of other tissues, it is clear that the patterns of occurrence in the population, time trends, and survival rates vary considerably. Risk factors and causes of some cancers have been identified, discussed in other chapters in this volume, but additional research is still warranted. Primary prevention, when feasible, is the most efficient method to avoid the development of cancer. As is evident from the variation in survival rates by stage of disease, one of the most important factors influencing outcome is early diagnosis.

Acknowledgments

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