Breast Cancer Facts & Figures 2003-2004

American Cancer Society®

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Acknowledgments

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What is breast cancer?

Cancers are a group of diseases that cause cells in the body to change and grow out of control. Most types of cancer cells form a lump or mass called a tumor, and are named after the part of the body where the tumor originates.

Breast cancer begins in breast tissue, which is made up of glands for milk production, called *lobules*, and the *ducts* that connect lobules to the nipple. The remainder of the breast is made up of fatty, connective, and lymphatic tissue.

- Most types of tumors that form in the breast are *benign*; that is, they are not cancerous. Although benign breast tumors are abnormal growths, they do not grow uncontrollably or spread, and are not life-threatening.
- Some breast tumors are cancerous, but are called *in situ*, because they have not yet spread beyond the area where they began. *In situ* breast cancers are confined within the ducts (ductal carcinoma *in situ*) or lobules (lobular carcinoma *in situ*) of the breast. Nearly all cancers at this stage can be cured. Many oncologists believe that lobular carcinoma *in situ* (also known as lobular neoplasia) is not a true cancer but an indicator of increased risk for developing invasive cancer in the future.
- Other cancerous breast tumors are *invasive*, or infiltrating. These cancers start in the lobules or ducts of the breast but have broken through the duct or gland walls to invade the surrounding fatty tissue of the breast. The seriousness of invasive breast cancer is strongly influenced by the *stage* of the disease, that is, how far the cancer has spread when it is first diagnosed:

  – Local stage describes tumors confined to the breast.

  – Regional stage describes tumors that have spread to surrounding tissue or nearby lymph nodes.

  – Distant stage describes cancers that have metastasized (spread) to distant organs.

Who gets breast cancer?

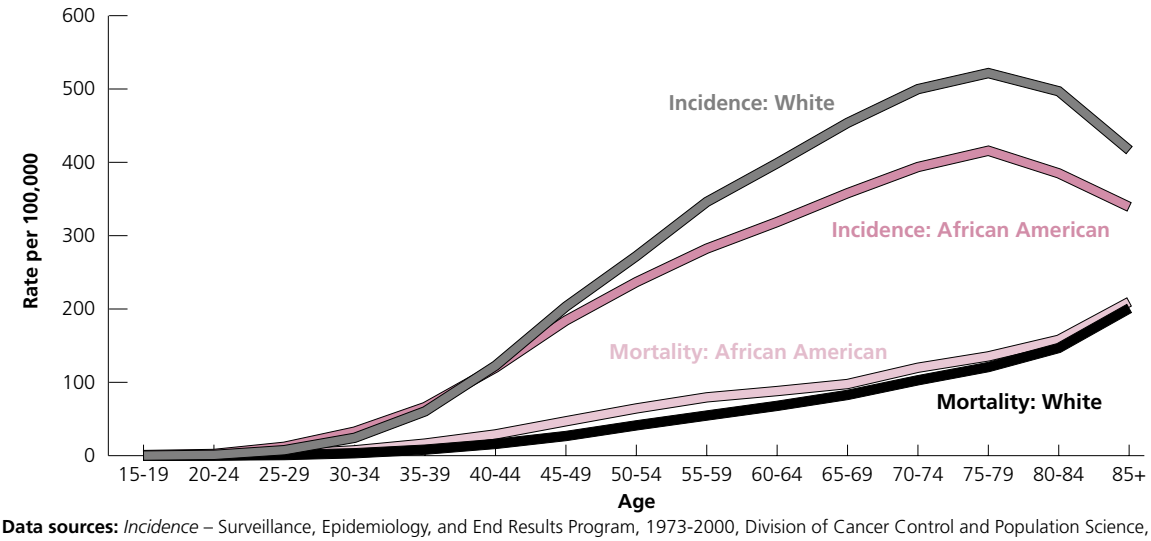
Sex

- Excluding cancers of the skin, breast cancer is the most common cancer among women, accounting for nearly one of every three cancers diagnosed in US women.
- Men are generally at low risk of developing breast cancer; however, they should be aware of risk factors, especially family history, and report any change in their breasts to a physician.

Age

- The incidence and death rates from breast cancer increase with age (Figure 1). Ninety-four percent of new cases and 96% of breast cancer deaths reported during 1996-2000 occurred in women ages 40 and older.[1]

Figure 1. Female Breast Cancer – Age-Specific Incidence and Death Rates, by Race, United States, 1996-2000



Data sources: *Incidence* – Surveillance, Epidemiology, and End Results Program, 1973-2000, Division of Cancer Control and Population Science, National Cancer Institute, 2003. *Deaths* – National Center for Health Statistics, Centers for Disease Control and Prevention, 2003.

American Cancer Society, Surveillance Research, 2003

- For the period 1996-2000, women ages 20-24 have the lowest incidence rate, 1.4 cases per 100,000 population; women ages 75-79 have the highest incidence rate, 499.0 cases per 100,000.[2]

Race/Ethnicity

- White women have a higher incidence of breast cancer than African American women after age 40, while African American women have a slightly higher incidence rate before age 40. In contrast, African American women are more likely to die from breast cancer at every age[1] (Figure 1).
- Incidence and death rates from breast cancer are generally lower among women of other racial and ethnic groups than in white and African American women[2] (Figure 2).
- Table 1 shows breast cancer incidence and death rates for white and African American women by state. Among white women, breast cancer incidence rates range from 118.7 in Utah to 152.1 in Hawaii.[3] Breast cancer incidence rates among African American women range from 89.8 in Rhode Island to 147.6 in Alaska.[3] Incidence rates, especially of *in situ* breast cancers, reflect the intensity of screening as well as disease occurrence. Despite higher incidence rates, breast cancer death rates are lower among white women compared to African American women. Breast cancer death rates among white women range from 23.7 in Arkansas to 31.2 in New Jersey.[3] In contrast, breast cancer death rates among African American women range from 27.4 in Rhode Island to 42.6 in the District of Columbia.[3]

Table 1. Female Breast Cancer Incidence and Death Rates* (1996-2000) by Race and State

	White		African American			White		African American	
State	Incidence†	Mortality‡	Incidence†	Mortality‡	State	Incidence†	Mortality‡	Incidence†	Mortality‡
Alabama	§	24.6	§	33.3	Montana	133.9	24.8	§	¶
Alaska	146.0	25.9	147.6	¶	Nebraska	130.5	25.3	121.7	41.8
Arizona	123.9	25.7	95.6	33.2	Nevada	§	26.9	§	32.2
Arkansas	§	23.7	§	37.4	New Hampshire	§	28.2	§	¶
California	140.9	27.6	119.4	34.9	New Jersey	143.1	31.2	115.7	37.2
Colorado	137.5	24.1	99.3	36.0	New Mexico	122.3	26.1	94.4	40.2
Connecticut	144.4	27.5	115.7	33.1	New York	135.5	30.4	99.3	32.3
Delaware	§	29.7	§	39.1	North Carolina	124.6	24.9	111.2	36.2
Dist. of Columbia	§	27.4	§	42.6	North Dakota	§	26.6	§	¶
Florida	133.7	25.0	103.4	31.9	Ohio	128.5	29.1	117.1	38.6
Georgia	§	25.1	§	34.2	Oklahoma	§	26.7	§	38.8
Hawaii	152.1	27.1	§	¶	Oregon	143.4	26.8	121.5	29.7
Idaho	129.9	26.6	§	¶	Pennsylvania	130.1	29.0	116.2	37.7
Illinois	134.2	29.2	121.8	39.9	Rhode Island	135.7	29.7	89.8	27.4
Indiana	§	27.7	§	40.0	South Carolina	§	24.8	§	36.4
Iowa	130.6	26.4	128.8	37.4	South Dakota	§	25.3	§	¶
Kansas	§	25.5	§	40.1	Tennessee	§	26.0	§	37.0
Kentucky	122.8	26.8	127.6	35.7	Texas	§	25.2	§	37.1
Louisiana	124.4	27.3	114.2	38.2	Utah	118.7	23.8	40.3	¶
Maine	§	26.5	§	¶	Vermont	§	27.4	§	¶
Maryland	§	28.3	§	35.5	Virginia	§	27.1	§	38.2
Massachusetts	§	29.0	§	27.5	Washington	146.7	26.0	114.1	38.6
Michigan	132.1	27.3	121.4	36.9	West Virginia	119.9	27.4	115.9	42.5
Minnesota	137.8	26.7	104.2	34.5	Wisconsin	132.1	26.5	116.1	30.7
Mississippi	§	24.8	§	37.4	Wyoming	126.6	26.6	§	¶
Missouri	§	26.3	§	37.1					

*All rates are per 100,000 and age-adjusted to 2000 US standard population.

†Source is SEER and NPCR areas reported by the North American Association of Central Cancer Registries as meeting high quality standards for 1996-2000.

‡Death data are from CDC's National Vital Statistics System and cover the entire US population (http://www.cdc.gov/nchs).

§Statistic could not be calculated because state did not submit data to NAACCR, meet quality standards, or had six or fewer cases.

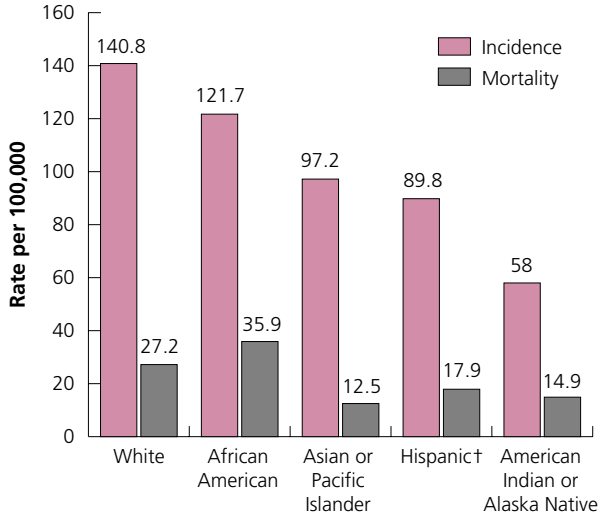
¶25 or fewer deaths; statistic could not be calculated.

American Cancer Society, Surveillance Research, 2003.

How many cases and deaths are estimated to occur in 2003?

- In 2003, an estimated 211,300 new cases of invasive breast cancer are expected to be diagnosed among women, as well as an estimated 55,700 additional cases of *in situ* breast cancer[4] (Table 2).

Figure 2. Female Breast Cancer Incidence and Death Rates,* by Race and Ethnicity, United States, 1996-2000



*Rates are age-adjusted to the 2000 US standard population.
†Persons of Hispanic origin may be any race.

Data sources: *Incidence* – Surveillance, Epidemiology, and End Results Program, 1973-2000, Division of Cancer Control and Population Science, National Cancer Institute, 2003. *Deaths* – National Center for Health Statistics, Centers for Disease Control and Prevention, 2003.

American Cancer Society, Surveillance Research, 2003.

- In 2003, 39,800 women are expected to die from this disease. Only lung cancer accounts for more cancer deaths in women[4] (Table 2).
- In 2003, about 1,300 cases and 400 deaths from breast cancer are expected to occur among men, accounting for less than 1% of all breast cancers.[4]

How has the occurrence of breast cancer changed over time?

Incidence Trends

Invasive breast cancer

Incidence rates of invasive female breast cancer for all races combined show three distinct phases since 1973, when broad surveillance of cancer began:

- Between 1973 and 1980, incidence was essentially constant;
- Between 1980 and 1987, incidence increased by almost 4% per year;
- Between 1987 and 2000, incidence rates increased by 0.4% per year.[2]

Much of the long-term underlying increase in incidence is attributed to changes in reproductive patterns, such as delayed childbearing and having fewer children. The more rapid increase between 1980 and 1987 is due largely to greater use of mammography screening and increased detection of breast cancers too small to be felt, with diagnosis of smaller, more easily treatable cancers.

Table 2. Estimated New Breast Cancer Cases and Deaths in Women by Age, United States, 2003

Age	In Situ Cases*	%	Invasive Cases*	%	Deaths*	%
<30	100	0.2	1,000	0.5	100	0.3
30-39	2,100	3.8	10,500	5.0	1,300	3.3
40-49	12,600	22.6	35,500	16.8	4,300	10.8
50-59	15,700	28.2	48,700	23.0	7,000	17.6
60-69	11,500	20.6	43,100	20.4	7,400	18.6
70-79	10,100	18.1	45,600	21.6	9,500	23.9
80+	3,500	6.3	27,000	12.8	10,100	25.4
Total	**55,700**	**100.0**	**211,300**	**100.0**	**39,800**	**100.0**

*Rounding to nearest hundred
Percentages may not exactly total 100%, due to rounding.

American Cancer Society, Surveillance Research, 2003.

During this short period, incidence rates of smaller tumors (≤2.0 cm) more than doubled, while rates of larger tumors (3.0 cm or more) decreased 27%.[5] For the most recent period, the trend in diagnosis of smaller tumors (≤2.0 cm) continued, increasing by 1.9% per year since 1988 (Figure 3). The increase was also limited to cancers diagnosed at a localized stage (Figure 4).

Age

Between 1975 and 2000, incidence rates of invasive breast cancer among women 40 and older increased 4% per year from 1980 to 1987, and stabilized thereafter, reflecting the overall incidence trends for all age groups. In contrast, incidence rates of invasive breast cancer in women under age 40 remained essentially constant[1] (Figure 5).

Figure 3. Trends in Female Breast Cancer Incidence Rates by Tumor Size and Race, 1988-89 to 1999-2000

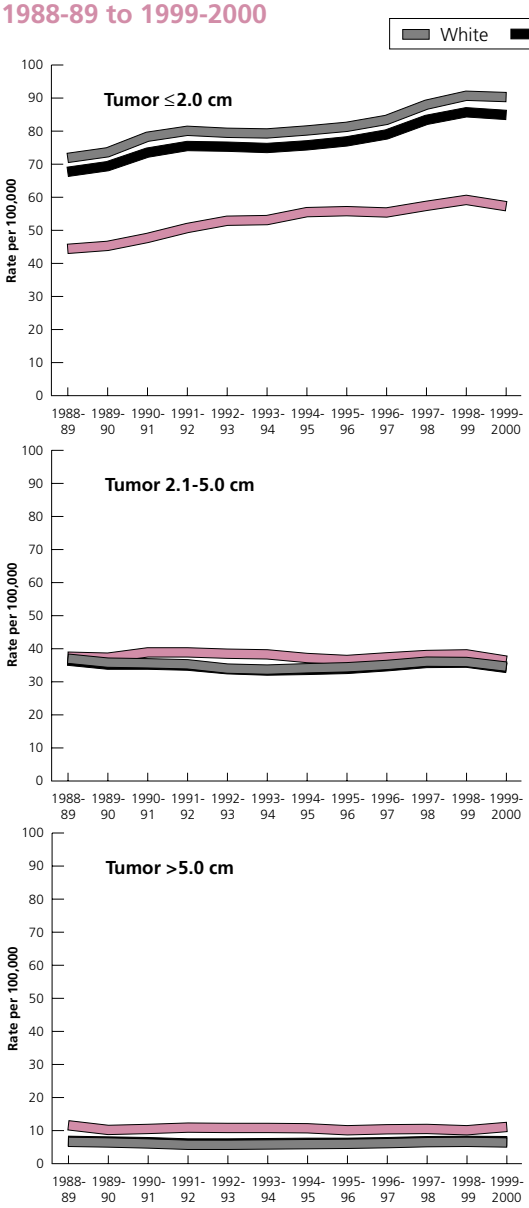
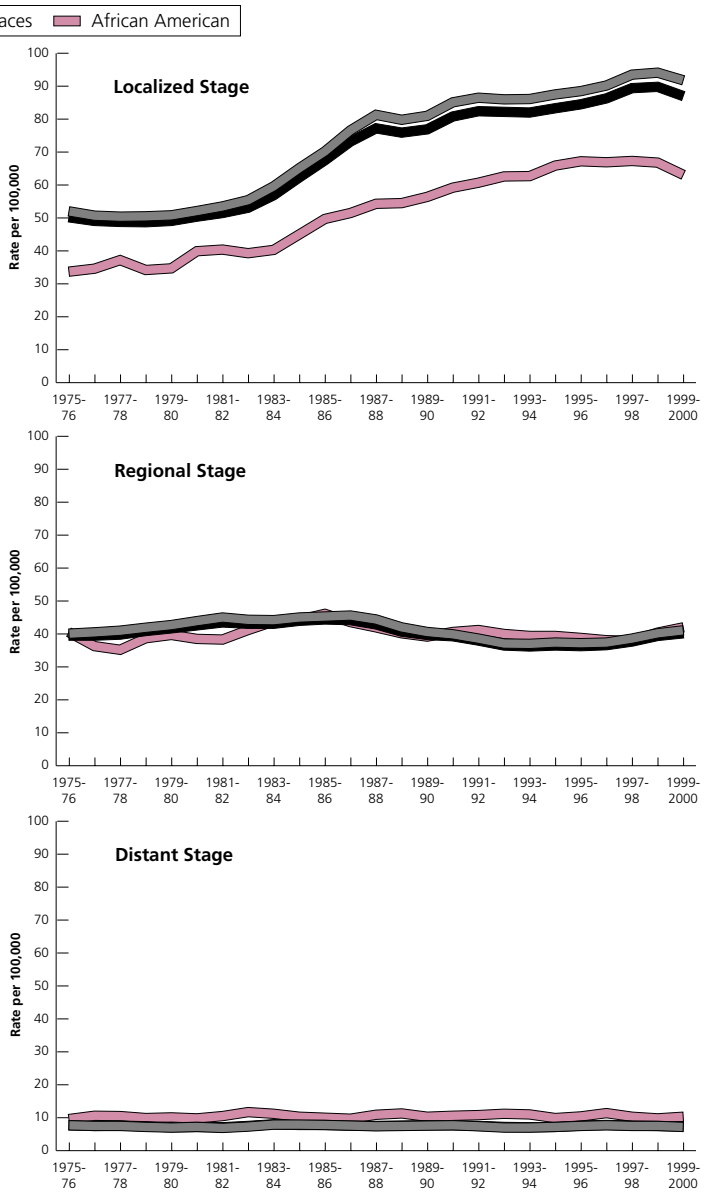


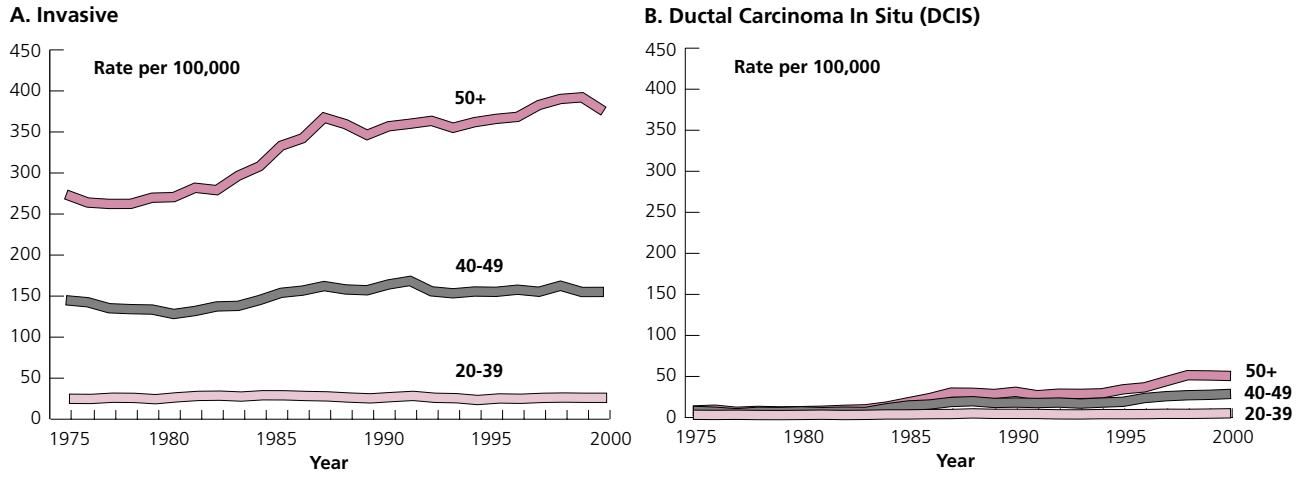
Figure 4. Trends in Female Breast Cancer Incidence Rates by Stage and Race, 1975-76 to 1999-2000



Data source: Surveillance, Epidemiology, and End Results Program, 1973-2000, Division of Cancer Control and Population Science, National Cancer Institute, 2003.

American Cancer Society, Surveillance Research, 2003.

Figure 5. Female Breast Cancer – Invasive and Ductal Carcinoma In Situ (DCIS) Age-Adjusted Incidence Rates*, by Age, United States (SEER), 1975-2000



*Rates are age-adjusted to the 2000 US standard population within each age group.

Data source: Surveillance, Epidemiology, and End Results Program, 1973-2000, Division of Cancer Control and Population Science, National Cancer Institute, 2003.

American Cancer Society, Surveillance Research, 2003.

Race/Ethnicity

Figure 6 presents trends in invasive female breast cancer incidence rates by race and ethnicity. During 1992-2000, incidence rates increased overall in Asian and Pacific Islanders (2.1% per year), Hispanics (1.3% per year), and whites (0.9% per year), while rates decreased overall (3.7%) in American Indian and Alaska Natives and stabilized in African Americans.

Breast cancer trends by tumor size differed between white and African American women: African American women were less likely to be diagnosed with smaller tumors (≤2.0 cm) and more likely to be diagnosed with larger tumors (>5.0 cm) than white women (Figure 3).

In situ breast cancer

Incidence rates of *in situ* breast cancer have increased considerably over the past 25 years[1] largely because of increased diagnosis using mammography. Most of this increase represents increased detection of ductal carcinoma in situ (DCIS), which from 1996 to 2000 accounted for 88% of the *in situ* breast cancers diagnosed. Over the entire period of 1975 to 2000, incidence rates of DCIS breast cancer increased 5 times faster than the incidence rates of invasive breast cancer. The DCIS rate increased in all age groups, although the increase was larger in women age 50 and older[1] (Figure 5).

Most cases of DCIS are detectable only through mammography, and the large increases in DCIS incidence rates since 1982 are a direct result of mammography's ability to detect tumors when they are very small. Although increases in both invasive breast cancer and DCIS incidence rates have slowed since the mid-1980s,[7] DCIS continued to increase at a faster rate.

Lobular carcinoma *in situ* (LCIS) is less common than DCIS, accounting for less than 15% of female *in situ* breast cancers diagnosed from 1996 to 2000.[1] However, since 1975, LCIS incidence rates increased more than 2 times faster than the incidence rates of invasive breast cancer.[1] In addition, LCIS incidence rates increased continuously among postmenopausal women.[8]

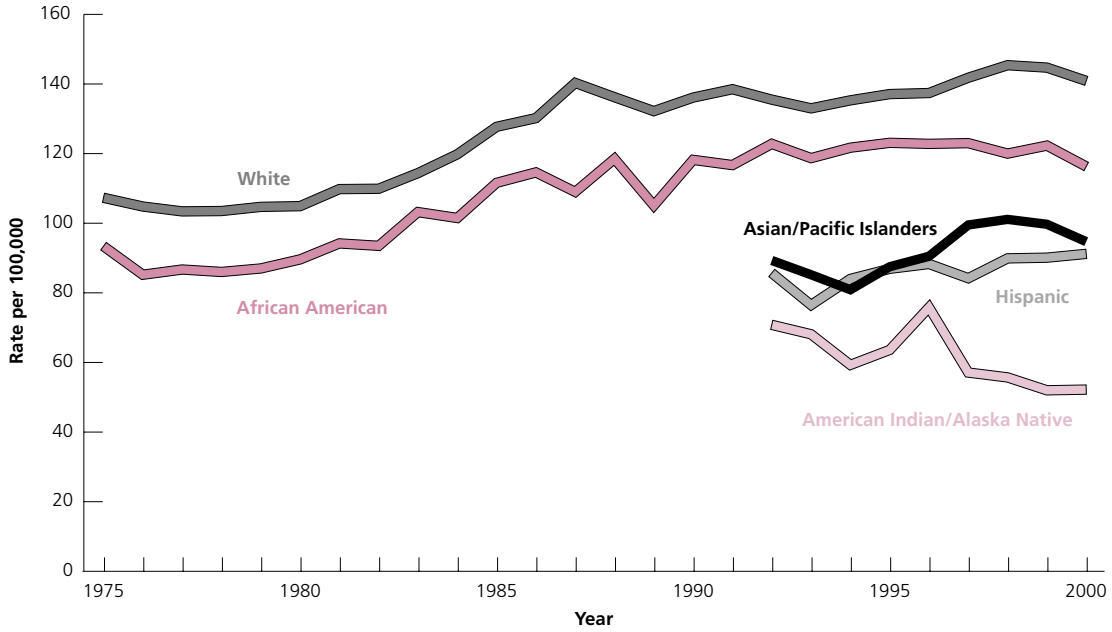
Mortality Trends

There has been an important reduction in female breast cancer death rates in recent years:

- Between 1975 and 1990, the death rate for all races combined increased by 0.4% annually;
- Between 1990 and 2000, the rate decreased by 2.3% annually.[2]

The decline was more pronounced among younger age groups. Death rates decreased by 3.7% per year among women under age 50, from 1991 to 2000, and by 2.0% per year among women 50 and older from 1990 to 2000. This decline in breast cancer mortality since 1990 has been attributed to both improvements in breast cancer treatment and early detection. However, African American women and women of other racial and ethnic groups have benefited less than white women from these

Figure 6. Female Breast Cancer Incidence Rates* by Race and Ethnicity, SEER, 1975-2000

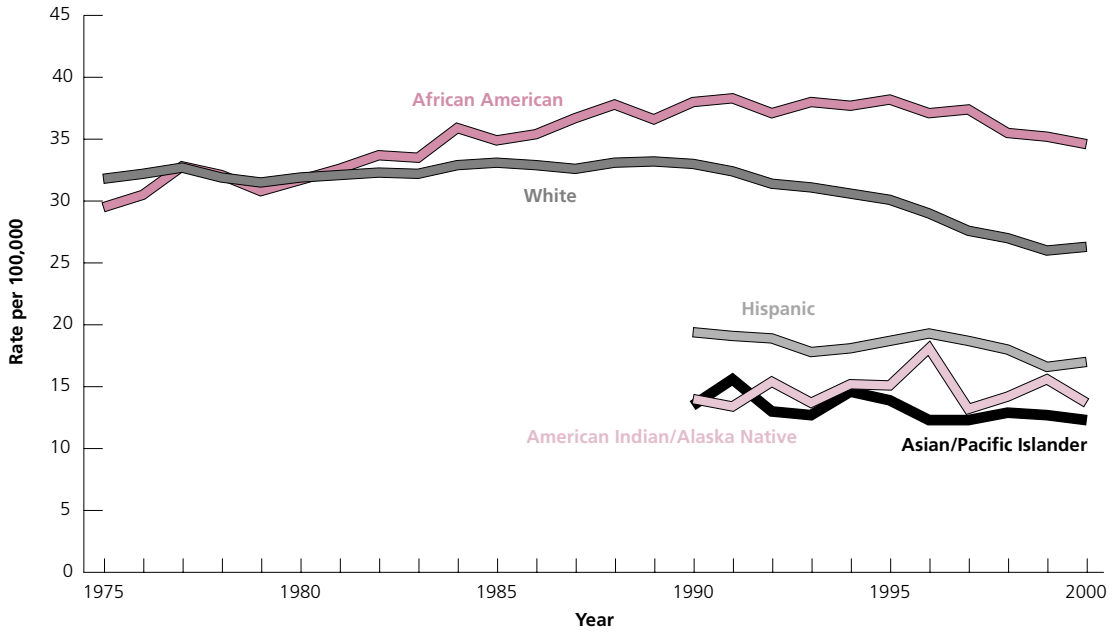


*Rates are age-adjusted to the 2000 US standard population.

Data source: Surveillance, Epidemiology, and End Results Program, 1973-2000, Division of Cancer Control and Population Science, National Cancer Institute, 2003.

American Cancer Society, Surveillance Research, 2003.

Figure 7. Female Breast Cancer Death Rates* by Race and Ethnicity, SEER, 1975-2000



*Rates are age-adjusted to the 2000 US standard population.

Data source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2003.

American Cancer Society, Surveillance Research, 2003.

advances. From 1992 to 2000, female breast cancer death rates declined overall by 2.6% per year in whites, 1.4% in Hispanics, and 1.1% in African Americans and Asian and Pacific Islanders, while rates were constant among American Indian and Alaska Natives. More striking is the divergence of rates in long-term mortality trends between African American and white females (Figure 7). The disparity in breast cancer death rates between African American and white women began widening in the early 1980s; in 2000, there were over 30% excess deaths among African Americans compared to white women.[2]

What factors influence breast cancer survival?

Time since diagnosis

Based on the most recent data, relative survival rates for women diagnosed with breast cancer are:

- 87% at five years after diagnosis;
- 77% after 10 years;
- 63% after 15 years;
- 52% after 20 years.[2]

Analyses of long-term survival in cancer patients indicated that the 5-year relative survival rate of breast cancer among women who have already survived 5 years was 81% among white women and 76% among African American women. Among women who have already survived 10 years after diagnosis, the 5-year relative survival rate was 87% among white women and 85% among African American women.[9]

Age at diagnosis

For women under 40 years of age with breast cancer, 5-year relative survival rates are slightly lower, which may be due to their tumors being more aggressive and less responsive to hormonal therapy:[11-13]

- 83% for women ages < 45;
- 87% for women ages 45-54;
- 88% for women ages 55-64;
- 89% for women ages 65-74;
- 88% for women ages 65 and over;
- 86% for women ages 75 and over.[2]

Stage at diagnosis

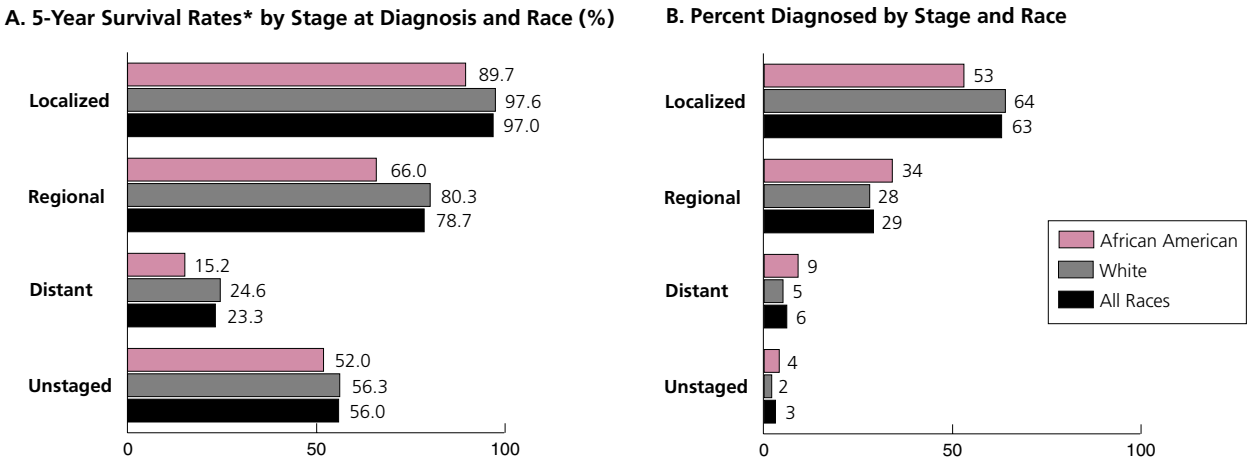
For women with a more advanced stage at diagnosis, 5-year relative survival is lower[2,13] (Figure 8).

Race/ethnicity and socioeconomic factors

African American women with breast cancer are less likely than white women to survive five years: 74% vs. 88%.[2,14] This difference can be attributed to both later stage at detection and poorer stage-specific survival.[15,16]

A lack of health insurance is associated with lower survival among breast cancer patients.[17,18] Moreover, breast cancer patients with lower incomes are more likely to be diagnosed with advanced stage of disease

Figure 8. Female Breast Cancer – United States, 1992-1999



*Survival rates are based on follow-up of patients diagnosed between 1992-99 and followed through 2000.

Data source: Surveillance, Epidemiology, and End Results Program, 1973-2000, Division of Cancer Control and Population Sciences, National Cancer Institute, 2003.

American Cancer Society, Surveillance Research, 2003.

and to have lower 5-year relative survival rates than higher-income patients.[19-21] For example, low-income African American women experience lower survival than higher-income African American women.[22,23] The presence of additional illnesses, lower socioeconomic status, unequal access to medical care, and disparities in treatment may contribute to the observed differences in survival between lower- and higher-income breast cancer patients, and African Americans and whites.[14,24-28]

What are the known risk factors for breast cancer?

A number of factors associated with increased risk of breast cancer (age, family history, age at first birth, early menarche, late menopause) are not modifiable. Other factors (postmenopausal obesity, use of postmenopausal hormones, alcohol consumption, physical inactivity) are modifiable.[29] Some factors directly increase lifetime exposure of breast tissue to circulating ovarian hormones (early menarche, late menopause), and some are only correlates of reproductive factors (higher socioeconomic status). Established risk factors for breast cancer are listed in Table 3 in order of the strength of their association.

Although some have suggested that there may be an increased risk for breast cancer among women who wear underwire bras or who use antiperspirants, at present, there is no scientific evidence that shows an association between underwire bras or antiperspirants[30] and breast cancer. Others have suggested that women who have had an abortion may be at an increased risk for developing breast cancer, but a recent review by a panel of experts concluded that there is no evidence between having had an abortion and subsequently developing breast cancer.[31] Despite concern that rising breast cancer incidence in the latter half of the 20th century may have been caused by environmental pollutants, such as the rise of organochlorine pesticides, numerous studies have found no relationship between exposure to common organochlorines and breast cancer in the

Table 3. Factors That Increase the Relative Risk for Breast Cancer in Women

Relative Risk	Factor
Relative Risk > 4.0	• Age (65+ vs. <65 years, although risk increases across all ages until age 80) • Certain inherited genetic mutations for breast cancer (BRCA1 and/or BRCA2) • Two or more first-degree relatives with breast cancer diagnosed at an early age • Personal history of breast cancer • Postmenopausal breast density
Relative Risk 2.1-4.0	• One first-degree relative with breast cancer • Biopsy-confirmed atypical hyperplasia • High-dose radiation to chest • High bone density (postmenopausal)
Relative Risk 1.1-2.0	
Reproductive factors	• Late age at first full-term pregnancy (>30 years) • Early menarche (<12 years) • Late menopause (>55 years) • No full-term pregnancies • Never breast fed a child
Factors that affect circulating hormones	• Recent oral contraceptive use • Recent and long-term use of hormone-replacement therapy • Obesity (postmenopausal)
Other factors	• Personal history of cancer of endometrium, ovary, or colon • Alcohol consumption • Tall • High socioeconomic status • Jewish heritage

Adapted, with permission, from Hulka et al, 2001.

general population.[32,33] To determine one's risk for developing breast cancer, risk assessment tools are available at the Harvard Center for Cancer Prevention's Web site (http://www.yourcancerrisk.harvard.edu/) and the National Cancer Institute's Web site (http://bcra.nci.nih.gov/brc/).

Increasing age

Besides being female, age is a woman's single most important risk factor for developing breast cancer.[34] Currently, a woman living in the United States has a 13.4%, or a 1 in 7, lifetime risk of developing breast cancer. However, a large portion of the overall lifetime risk is due to the risks at older ages. Table 4 gives a woman's risk of developing breast cancer at different ages.

Family history of breast cancer/ genetic predisposition

Women with a family history of breast cancer, especially in a first-degree relative (mother, sister, or daughter), have an increased risk of developing breast cancer themselves.[35] The risk is even higher if more than one first-degree relative has or had breast cancer, or if the relative developed breast cancer before age 40, or in both breasts.[36]

Approximately 5% to 10% of breast cancer cases result from inherited mutations, or alterations, in breast cancer susceptibility genes, such as BRCA1 and BRCA2.[37] These mutations are present in far less than 1% of the general population.[38] Molecular tests are now commercially available to identify some of the BRCA mutations responsible for inherited forms of breast cancer, yet the optimal medical approach for individuals with significant family histories who are found to carry or not carry a mutation remains complex. Women who know they carry the mutated gene may use this information to make more informed decisions about their health care, including the use of tamoxifen (see page 11, section that discusses tamoxifen) and/or prophylactic surgery to delay or reduce the risk of cancer. These women should talk to their doctors about the benefits and limitations of starting mammography earlier (e.g., at age 30) and having additional tests (i.e., ultrasound and MRI).[39]

It is not yet possible to predict if or when women who carry a particular mutation will develop breast cancer. Furthermore, tests are not available for all of the genes that affect breast cancer risk. The American Cancer Society, American Society for Clinical Oncology, and other organizations strongly recommend that any person considering genetic testing talk with a genetic counselor, nurse, or doctor who is qualified to interpret and explain the test results, before they proceed with testing. People should understand and carefully weigh the benefits and risks of genetic testing before these tests are done.

While a family history of breast cancer suggests an inherited influence on disease risk, scientists believe that most of the occurrence of breast cancer in families is the result of the interactions between similar lifestyles among family members and low-risk variations in genetic susceptibility that may be shared by women in the family.[40] For most women whose family history of breast cancer consists of one first-degree relative diagnosed after menopause, risk is greater, but not significantly greater, than for women without a family history.

Hormonal factors

Studies suggest that reproductive hormones influence breast cancer risk through effects on cell proliferation and DNA damage, as well as promotion of cancer growth.[41] Early menarche (<12 years), older age at menopause, older age at first full-term pregnancy, and fewer number of pregnancies all increase a woman's risk of breast cancer by affecting endogenous reproductive hormones.[42] Recent use of oral contraceptives may slightly increase the risk of breast cancer;[43,44] however, women who stopped using oral contraceptives 10 years or more in the past have the same risk as women who have never used the pill.[45] Recent use of combination hormone replacement therapy (HRT) has been shown to increase breast cancer risk, with higher risk associated with longer use.[46-49]

Table 4. Age-Specific Probabilities of Developing Breast Cancer*

If current age is…	Then the probability of developing breast cancer in the next 10 years is:†	or 1 in:
20	0.05%	2,152
30	0.40%	251
40	1.45%	69
50	2.78%	36
60	3.81%	26
70	4.31%	23

*Among those free of cancer at beginning of age interval. Based on cases diagnosed 1988-2000. Percentages and "1 in" numbers may not be numerically equivalent due to rounding.

†Probability derived using NCI DEVCAN software.

American Cancer Society, Surveillance Research, 2003.

A Comment About Relative Risk

Relative risk compares the risk of disease among people with a particular exposure to the risk among people without that exposure. If the relative risk is above 1.0, then risk is higher among exposed than unexposed persons. Relative risks below 1.0 reflect an inverse association between a risk factor and the disease, or a protective effect. However, while relative risks are useful for comparisons, they do not provide information about the absolute amount of additional risk experienced by the exposed group.

For example, current users of combination estrogen and progestin hormone therapy (HRT) have a relative risk of developing breast cancer of 1.26, or a 26% increased risk. Among 10,000 women who use HRT for 5.2 years, the estimated number of breast cancers expected to be diagnosed is 38. Among 10,000 women of the same ages who never used HRT, 30 cases would be expected over the same period. Therefore, the 26% increased risk results in a total of 8 additional cases per 10,000 women to be diagnosed over a period of 5.2 years.[50]

Can breast cancer be prevented?

At this time, there is no guaranteed way to prevent breast cancer, which is why regular mammograms are so important. A woman's best overall preventive health strategy, besides regular mammograms, is to reduce her known risk factors whenever possible, by avoiding obesity and weight gain, increasing physical activity, and minimizing alcohol intake.[29] Women should consider the increased risk of breast cancer associated with use of combined estrogen and progestin hormone therapy in evaluating treatment options for menopausal symptoms. Tamoxifen can reduce the risk of breast cancer among women at high risk (see page 11, section on tamoxifen).

Obesity

A recent large American Cancer Society study showed that overweight women are 60% more likely to die from breast cancer compared to normal weight women.[51] Thus risk may relate particularly to weight gain and postmenopausal breast cancer,[52] and to women who have never taken hormone replacement therapy.[53,54] The relationship with obesity has been shown to be reversed in premenopausal women.[55] Given the increasing percentage of women in the United States who are overweight, strategies to maintain a healthy body weight are important to reducing the risk of breast cancer and other diseases.[56]

Physical activity

The available evidence supports a small protective association between physical activity and breast cancer.[57] The protective effects may be greater among lean women, women who have carried children to term, and premenopausal women. The underlying mechanism of this potential protection is not well understood, although it has been hypothesized that the benefit may be due to the effects of physical activity on hormones and energy balance.[57,58] In addition, type of physical activity (recreational versus occupational), frequency, duration, intensity, and time periods in life that are associated with breast cancer risk reduction are areas of ongoing investigation.

Alcohol consumption

Alcohol is the dietary factor most consistently associated with an increased breast cancer risk.[29] A meta-analysis of more than 40 epidemiologic investigations suggests that the equivalent of two drinks a day (or 24 g of alcohol) may increase breast cancer risk by approximately 21%. This increased risk is dose-dependent and exists regardless of the type of alcoholic beverage consumed.[59] A recent review concluded that the most likely mechanism by which alcohol increases risk of breast cancer is by increasing estrogen and androgen levels.[60] Thus, reducing alcohol intake may be a useful strategy for reducing breast cancer risk among regular consumers of alcohol.

HRT

Use of combination estrogen and progestin HRT increases risk of breast cancer (see example above in box). The US Preventive Services Task Force has recommended against the routine use of estrogen and progestin for the prevention of chronic diseases in postmenopausal women. The balance of benefit

(including increased mineral bone density and decreased risk of colorectal cancer) and harm (including increased risk of breast cancer, heart disease, and dementia) for an individual woman will be influenced by her individual risks for specific chronic diseases, personal preferences, and the presence of menopausal symptoms.[61]

Tamoxifen

The drug tamoxifen has been used for many years as a treatment for some breast cancers. The National Surgical Adjuvant Breast and Bowel Project P-1 Study demonstrated that tamoxifen can also be used to reduce the risk of breast cancer in women at high risk for developing the disease.[62] After a median follow-up of over 69 months, the group that received tamoxifen had their breast cancer risk reduced by 49%, with 22 cases of breast cancer diagnosed per 1,000 women, compared to 43 cases per 1,000 in the group who did not receive tamoxifen. A protective effect was also observed in an international randomized prevention trial.[63] In that trial, the group that received tamoxifen reduced their breast cancer risk by 32%, with 69 cases diagnosed among 3,578 women in the tamoxifen group, compared to 101 cases among 3,566 women in the group not receiving tamoxifen. Administration of tamoxifen resulted in side effects in both trials, particularly an increased risk of endometrial cancer. Women who are at increased risk of breast cancer should discuss taking tamoxifen with their doctor. It is estimated that over two million US women would benefit from tamoxifen chemoprevention.[64]

Prophylactic mastectomy

Women at very high risk of breast cancer may elect prophylactic (preventive) mastectomy. This is an operation in which one or both breasts are removed before there is a known breast cancer. A recent study reported a greater than 90% reduction in risk of breast cancer in high-risk women with family history who received prophylactic mastectomy.[65] Subsequent studies confirmed the benefit of prophylactic mastectomy in genetically susceptible women, i.e., women with BRCA1 and BRCA2 mutations.[66,67] While the operation reduces the risk of breast cancer, it does not guarantee that cancer won't develop in the small amount of breast tissue remaining after the operation. A woman considering this operation should discuss these considerations carefully with her doctor. A second opinion is strongly recommended.

How can breast cancer be detected early?

Signs and Symptoms of Breast Cancer

Early-stage breast cancer, when the tumor is small and most treatable, typically does not produce any symptoms. It is therefore very important for women to follow recommended guidelines for finding breast cancer at this early stage. The most important physical symptom of breast cancer is a painless mass.[34] Up to 10% of patients, however, have breast pain and no mass.[68] Less common symptoms include changes to the breast that don't go away, such as thickening, swelling, skin irritation or distortion, and nipple symptoms, including spontaneous discharge, erosion, inversion, or tenderness.[34]

American Cancer Society guidelines for the early detection of breast cancer change as a woman ages, and include mammography and clinical breast examination (CBE).[39] In 2003, the American Cancer Society dropped its recommendation that all women perform breast self-examination (BSE) monthly. The Society still recommends, however, that women be told of the benefits and limitations of BSE, and those women who wish to do it should receive instruction from their health care providers (Table 5). These guidelines are for women who have no symptoms of breast cancer and who have not been identified to be at significantly higher risk for the disease.

Because a small percentage of cancers may be missed by mammography, it is very important that women age 40 and older have an annual CBE and maintain a high sense of awareness about breast symptoms.[39] If symptoms develop after a recent, normal mammogram, a woman

Table 5. American Cancer Society Guidelines for the Early Detection of Breast Cancer in Asymptomatic Women

Age 40 and older

- Annual mammogram
- Annual clinical breast examination
- Monthly breast self-examination (optional)

Age 20-39

- Clinical breast examination every three years
- Monthly breast self-examination (optional)

should *not* assume that it is nothing to worry about and should contact her doctor immediately. Likewise, a palpable mass that is not seen on a diagnostic mammogram does not rule out breast cancer; instead, it simply means that other diagnostic tests will need to be considered.

Mammography

Although there has been some debate about the benefit of mammographic screening in reducing breast cancer mortality,[69] numerous randomized trials as well as population-based screening evaluations have clearly shown that early detection of breast cancer through mammography greatly improves treatment options, the chances for successful treatment, and survival.[70-73] Mammography is the single most effective method of early detection, since it can identify cancer several years before physical symptoms develop. Treatment is more successful when cancer is discovered early.

What is mammography?

Mammography is a low-dose x-ray procedure that allows visualization of the internal structure of the breast. It is highly accurate, but like most medical tests, it is not perfect. On average mammography will detect about 90% of the breast cancers in women without symptoms. Testing is somewhat more accurate in postmenopausal women compared with premenopausal women.[74] The small percentage of breast cancers that are not identified by mammography may be missed for any of the following reasons: breast density, faster growth rate, or failure to see the small, early signs of an abnormality. Although the overwhelming majority of women who undergo screening each year do not have breast cancer, about 5%-10% of women have their mammograms interpreted as abnormal or inconclusive, and further tests are done. In most instances, additional imaging tests lead to a final, normal interpretation.

Today's modern, dedicated screen-film units result in higher quality images with considerably lower x-ray dose than the general-purpose x-ray equipment used in the past. The Mammography Quality Standards Act, passed by Congress in 1992 and administered by the Food and Drug Administration, requires facilities to meet specific standards of quality in order to offer mammography.

Prevalence of mammography

According to data from the 2000 Behavioral Risk Factor Surveillance System (BRFSS), 62.6% of US women age 40 and older have had a recent mammogram.[75] Table 6 shows these results by state.[76] An analysis of the National Health Interview Survey indicates that women with less than a high school education, without health insurance coverage, or who are members of an ethnic minority are the least likely to have had a recent mammogram (Table 7).[77] Efforts to increase screening should specifically target recent immigrants and socioeconomically disadvantaged women who are most likely to underutilize mammography screening.[77]

Clinical Breast Examination

A clinical examination performed by a trained health care professional offers substantial benefit in screening for breast cancer and should be performed in combination with mammography. Preferably, women should schedule their CBE to occur near the time of, or before, their annual mammogram. For CBE, the woman undresses from the waist up. Using the pads of the fingers, the examiner will gently feel the breasts, giving special attention to their shape and texture, location of any lumps, and whether such lumps are attached to the skin or to deeper tissues. The area under both arms will also be examined.

Self-Awareness

A woman who chooses to perform breast self-exams should receive instructions and have her technique reviewed by a health care professional who performs clinical examinations.[39] However, all women should become familiar with both the appearance and feel of their breasts so that they notice any changes. Changes should be reported promptly to a doctor or nurse. Lumps are not necessarily abnormal, as they can appear and disappear with a woman's menstrual cycle. Of lumps detected and tested, most are not cancerous.

How is breast cancer treated?

Treatment decisions are made by the patient and her physician after consideration of the optimal treatment available for the stage and biological characteristics of the cancer, the patient's age and preferences, and the risks and benefits associated with each treatment protocol.[78] Most women with breast cancer will have some type of surgery. Surgery is often combined with other treatments such as radiation therapy, chemotherapy, hormone therapy, and/or monoclonal antibody therapy.[79] Treatment guidelines from the National Comprehensive Cancer Network (NCCN) are available through the American Cancer Society Web site.

Table 6. Mammography and Clinical Breast Exam, Women 40 and Older, by State, 2000

State	% Recent Mammogram*			% Recent Mammogram and Clinical Breast Exam†		
	40+ yrs.	40-64 yrs.	65+ yrs.	40+ yrs.	40-64 yrs.	65+ yrs.
Alabama	58.5	56.5	62.4	52.1	52.8	50.9
Alaska	61.7	58.6	76.8	57.2	55.2	66.8
Arizona	69.3	67.3	72.9	55.0	55.2	54.5
Arkansas	58.7	59.5	57.4	51.1	52.7	48.1
California‡	63.0	60.5	68.8	52.6	51.5	55.2
Colorado	60.2	57.9	66.0	53.6	52.2	57.2
Connecticut	73.2	72.4	74.8	66.0	67.9	62.5
Delaware	75.8	74.0	79.3	67.6	67.1	68.6
Dist. of Columbia	67.9	68.1	67.4	57.9	57.3	59.4
Florida	66.3	62.5	72.7	56.0	54.2	59.1
Georgia	60.4	59.2	63.6	53.4	53.3	53.7
Hawaii	65.8	65.9	65.6	57.5	58.6	55.0
Idaho	51.7	49.1	57.2	45.6	45.0	47.0
Illinois	63.4	64.1	61.9	55.5	58.1	50.1
Indiana	61.6	63.4	58.0	54.8	57.4	49.4
Iowa	62.8	63.7	61.3	56.8	58.6	53.5
Kansas	61.9	61.2	63.0	54.4	56.3	50.9
Kentucky	63.3	64.4	61.0	57.8	60.1	52.9
Louisiana	64.8	63.8	66.9	57.7	58.5	55.9
Maine	67.3	68.9	64.1	62.9	65.7	57.2
Maryland	69.2	67.5	73.3	62.3	61.7	63.7
Massachusetts	72.2	72.6	71.6	65.3	66.7	62.6
Michigan	69.1	68.1	71.2	61.3	62.8	58.1
Minnesota	61.3	61.2	61.6	54.5	57.3	48.5
Mississippi	51.5	54.6	45.4	45.5	49.6	37.3
Missouri	60.7	61.6	58.9	54.5	56.7	50.5
Montana	61.6	58.4	68.2	57.3	55.8	60.5
Nebraska	61.9	64.5	57.4	57.5	61.9	49.8
Nevada	61.9	58.7	69.7	50.6	52.6	45.9
New Hampshire	68.5	66.9	72.4	63.4	61.0	69.0
New Jersey	66.8	67.3	65.7	58.0	60.5	53.0
New Mexico	60.6	57.2	68.2	53.9	52.7	56.6
New York	68.2	69.0	66.7	60.3	62.3	56.1
North Carolina	64.8	64.2	65.9	59.4	60.7	56.8
North Dakota	62.0	60.1	65.3	55.1	55.2	55.0
Ohio	67.2	66.0	69.3	58.5	59.1	57.2
Oklahoma	55.8	54.6	58.1	50.1	50.0	50.4
Oregon	62.1	60.1	66.3	54.3	55.0	52.9
Pennsylvania	63.7	63.7	63.7	56.2	59.4	50.8
Rhode Island	71.5	71.3	72.0	65.5	66.3	64.2
South Carolina	64.8	62.7	69.3	57.0	56.1	59.1
South Dakota	62.7	61.2	65.2	57.7	58.2	57.0
Tennessee	62.6	63.2	61.5	54.7	56.8	50.4
Texas	57.2	55.0	62.2	48.7	47.4	51.6
Utah	53.0	51.5	56.7	47.1	46.8	47.9
Vermont	62.9	62.8	63.0	57.0	58.2	54.3
Virginia	61.9	58.7	69.3	54.0	53.3	55.6
Washington	58.8	57.8	61.1	51.7	51.9	51.5
West Virginia	61.6	60.3	63.9	55.3	57.3	51.6
Wisconsin	61.3	61.2	61.6	54.9	56.9	50.9
Wyoming	54.4	53.1	57.6	48.6	49.1	47.2
United States§	62.6	62.5	65.3	55.5	56.9	54.3
Range	51.5-75.8	49.1-74.0	45.4-79.3	45.5-67.6	45.0-67.9	37.3-69.0

*A mammogram within the past year. †Both a mammogram and clinical breast exam within the past year. ‡Questions for mammogram and clinical breast exam differed and may not be comparable to other state percentages in this table. §Median for all reporting states.

Source: Behavioral Risk Factor Surveillance System Public Use Data Tape 2000, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 2001.

American Cancer Society, Surveillance Research, 2003.

Table 7. Mammography, Women 40 and Older, United States, 2000

Characteristic	Prevalence (within 2 yrs)* %‡	Prevalence (within last yr)† %‡
Race/Ethnicity		
White§	72	57
African American§	68	53
Hispanic	63	48
American Indian/ Alaska Native§	52	26
Asian/Pacific Islander§	57	46
Total	70	55
Education (years)		
11 or fewer	57	42
12	69	55
13 or more	76	61
Health insurance coverage		
Yes	74	58
No	39	28
Immigration[77]		
In US <10 years	39	17
In US ≥10 years	65	32
Born in US	71	42

*A mammogram within the past two years.

†A mammogram within the past year.

‡Percentages are age-adjusted to the 2000 US standard population.

§Non-Hispanic.

Source: National Health Interview Survey, 2000, National Center for Health Statistics, Centers for Disease Control and Prevention, 2002.

American Cancer Society, Surveillance Research, 2003.

Surgery

The primary goal of breast cancer surgery is to remove the cancer from the breast and lymph nodes. In a lumpectomy, only cancerous tissue plus a rim of normal tissue is removed. Simple or total mastectomy includes removal of the entire breast. Modified radical mastectomy includes removal of the entire breast and lymph nodes under the arm, but does not include removal of the underlying chest wall muscle, as with a radical mastectomy. Radical mastectomy is used less frequently now due to the proven effectiveness of less disfiguring surgeries.[80]

Lumpectomy is almost always followed by six to seven weeks of radiation therapy. A woman who chooses lumpectomy and radiation will have the same expected long-term survival as if she chose mastectomy.[81]

Both lumpectomy and mastectomy are often accompanied by removal of regional (axillary) lymph nodes to determine if the disease has spread beyond the breast. The presence of any cancer cells in the lymph nodes will help determine the need for and course of subsequent therapy. Unfortunately, surgery or radiation therapy involving the axillary nodes can lead to serious swelling of the arm caused by fluid retention, known as lymphedema.[82] Newer options such as sentinel lymph node biopsy, where one to three key lymph nodes are removed and tested before any others are excised, may reduce the need for full axillary lymph node dissections, particularly in women with early-stage disease.

Radiation Therapy

Radiation may be used to destroy cancer cells remaining in the breast, chest wall, or underarm area after surgery, or to reduce the size of a tumor before surgery.[83] The ability to target radiation therapy accurately has increased dramatically over past decades, which has greatly diminished side effects.

Systemic Therapy

Systemic therapy includes chemotherapy and hormone therapy. After all visible cancer has been surgically removed, adjuvant systemic therapy is used to kill any undetected tumor cells that may have migrated to other parts of the body. Tumor size, histology, and the presence of cancer in axillary nodes are considered in the decision whether to use adjuvant systemic therapy. Adjuvant systemic therapy has been studied in over 400 randomized clinical trials, and has proven to reduce rates of recurrence and death more than 15 years after treatment.[84]

Systemic therapy is also used in treating women with metastatic breast cancer. In such conditions, removal of most of the cancer by surgery is not possible, and therefore systemic therapies are the main treatment option.

Biologic therapy

Herceptin®, the monoclonal antibody directed against the HER2/neu protein of breast tumors, also offers a real survival benefit for some women with metastatic breast cancer.[78,85-86]

Chemotherapy

Research has established that combinations of drugs are more effective than just one drug alone for breast cancer treatment.[84] If the disease has become resistant to the first-line therapies, which include specific combinations

of cyclophosphamide, methotrexate, fluorouracil, doxorubicin (adriamycin), epirubicin, and paclitaxel (taxol), about 20% to 30% of patients will respond to second-line drugs.[34]

Hormone therapy

Estrogen, a hormone produced by the ovaries, promotes the growth of some breast cancers. Women whose breast cancers test positive for estrogen receptors can be given hormone therapy to block the effects of estrogens on the growth of breast cancer cells. Tamoxifen, the most commonly used antiestrogen drug, has been shown to provide a 26% reduction in the annual recurrence rate and a 14% reduction in the death rate.[87] Hormone therapy is effective in both postmenopausal and premenopausal patients whose cancers are positive for steroid hormone receptors.[87]

A class of drugs known as aromatase inhibitors, drugs that interfere with the enzyme that synthesizes endogenous estrogen (produced by woman's body), appears to be beneficial in patients with metastatic breast cancer.[78,88-90] Specifically, the aromatase inhibitors, anastrozole and letrozole, are both more effective than tamoxifen for metastatic disease.[90]

Randomized Clinical Trials

A clinical trial is a controlled experiment that is used to assess the safety and efficacy of treatments for human disease and health problems. Generally, participants receive either the state-of-the-art standard treatment or a new therapy that may offer improved survival and/or fewer side effects. Participation in randomized clinical trials provides essential information on the effectiveness and risks of a new treatment. Patients can visit American Cancer Society/EmergingMed Clinical Trials Matching Services at http://clinicaltrials.cancer.org/. The Physicians Data Query (PDQ) program of the National Cancer Institute (NCI) contains summaries of cancer clinical trials that are open for patient participation. Patients can obtain PDQ information from their physicians, by contacting the NCI Cancer Information Service at 1-800-4-CANCER, or from the NCI CancerTrials Web page at cancertrials.nci.nih.gov.[91] Patients should consult their personal doctors and cancer specialists for detailed information about appropriate treatment options.

What research is currently being done on breast cancer?

Prevention

The antiestrogen tamoxifen was shown to reduce the incidence of breast cancer in high-risk women by almost half during a 5-year study period.[62] A second-generation antiestrogen, a selective estrogen receptor modulator (SERM) known as raloxifene, appears to be even more effective in reducing the risk of breast cancer in postmenopausal women taking the drug for osteoporosis.[92] The National Cancer Institute's Study of Tamoxifen and Raloxifene, or STAR trial, is comparing the efficacy of the two drugs in a randomized chemoprevention trial.[93] Researchers are also searching for ways to inhibit other molecular targets involved in breast cancer progression, such as the insulin-like growth factors.[94,95] In an effort to discover if lifestyle changes can affect the development of breast cancer among women with inherited susceptibility to the disease, such women are being studied to determine what other genetic and environmental factors increase or decrease the risk of breast cancer.[96]

Early Detection

Mammography is being improved by the use of computer-assisted diagnosis from digital images in addition to human interpretation of x-ray films.[97] Ultrasound is increasingly being used as an adjunct to mammography in finding breast tumors in women with dense breast tissue, e.g., premenopausal women, women with fibrocystic breasts, and women taking hormone replacement therapy who have experienced increased breast density.[98] MRI also is being evaluated for its role in screening and diagnostic studies in high-risk women.[99]

Treatment

A new understanding of breast tumor cell biology and molecular genetics is enabling researchers to design rational therapeutics that may have greater efficacy and fewer side effects than conventional chemotherapy. An estimated 40 to 50 antiangiogenesis compounds, drugs that block blood supply to the tumor(s), are in development for breast cancer.[100-102] Metronomic therapy, a relatively new concept in antiangiogenic therapy, uses much lower and less toxic doses of chemotherapy

agents than currently used, in combination with an antiangiogenesis drug.[103] Researchers have gotten promising results with metronomic therapy in mice genetically engineered to develop human-like breast cancers.

Quality of Life

Researchers are looking at an herbal formula to alleviate side effects of chemotherapy, such as fatigue, nausea, compromised immune function, and hair loss.[104] There is also an ongoing study to see if cognitive effects such as memory loss and depression (so-called "chemo brain") actually result from hormonal therapy or chemotherapy, or from the situation of having a life-threatening disease.[105] The study also asks if sexual and emotional intimacy is affected by breast cancer treatment, and what kinds of support can be offered to survivors and their partners.

What resources are available in your community?

The American Cancer Society offers several programs for breast cancer patients and their families:

Reach to Recovery®

Breast cancer survivors provide one-on-one support and information to help individuals cope with breast cancer. Specially trained survivors serve as volunteers, responding in person or by phone to the concerns of people facing breast cancer diagnosis, treatment, recurrence, or recovery.

I Can Cope®

Adult cancer patients and their loved ones learn ways to navigate the cancer experience while building their knowledge, coping skills, and positive attitude. In this

Goals for a National Breast Cancer Research Agenda

In 1998, the Breast Cancer Progress Review Group, a collaboration organized by the National Cancer Institute of prominent members from the scientific, medical, advocacy, and industry communities, released their recommendations for a national breast cancer research agenda.[106] The report included research goals in biology, etiology, genetics, prevention, detection and diagnosis, treatment, control, and outcomes. Among the goals in these eight areas are:

- To expand knowledge of normal breast development and the earliest breast lesions.
- To identify modifiable risk factors, and to investigate the interaction between genes and environment.
- To identify genetic mutations that occur at each stage of breast cancer development and progression, and evaluate these changes as targets for intervention.
- To identify surrogate endpoint biomarkers to serve as early indicators of intervention effectiveness.
- To develop better breast imaging and other technologies for diagnosis of clinically significant disease and better prediction of clinical outcomes.
- To encourage development of innovative treatments in academic settings, and to test their effectiveness through better supported, more representative clinical trials.
- To gain fuller understanding of mechanisms underlying behavioral change, and identify how psychosocial factors influence disease response and survival.
- To better understand the effects of multimodal treatments, and improve methods to study patient-focused outcomes across the continuum of age and race/ethnicity.

series of educational classes, doctors and other health care professionals provide information, encouragement, and practical tips in a supportive environment.

Look Good...Feel Better®

Through this free service, women in active cancer treatment learn techniques to restore their self-image and cope with appearance-related side effects. Certified beauty professionals provide tips on makeup, skin care, nail care, and head coverings. This program is a collaboration of the American Cancer Society with the Cosmetic, Toiletry, and Fragrance Association Foundation and the National Cosmetology Association.

"tlc" – Tender Loving Care®

A magazine and catalog in one, *"tlc"* supports women dealing with hair loss and other physical effects of cancer treatment. The magalog offers a wide variety of affordable products, such as wigs, hats, and prostheses, through the privacy and convenience of mail order.

Hope Lodge®

Hope Lodge is a home-like environment providing free, temporary sleeping accommodations for cancer patients undergoing treatment and their family members. It makes the cancer treatment process a little easier by providing a supportive environment and lifting the financial burden of an extended stay.

For information about these programs and what's available in your community, call the American Cancer Society at 1-800-ACS-2345 or visit the American Cancer Society Web site at www.cancer.org.

Other sources of patient information and support include:

Cancer Information Service of the NCI
1-800-4-CANCER (www.nci.nih.gov)

National Alliance of Breast Cancer Organizations (NABCO)
212-889-0606 (www.nabco.org)

National Coalition for Cancer Survivorship
1-877-NCCS YES (www.cansearch.org)

Susan G. Komen Foundation
1-800-IM AWARE or 1-800-462-9273 (www.komen.org)

Y-ME National Breast Cancer Organization
1-800-221-2141 (www.y-me.org)

YWCA Encore Plus Program
1-800-95E PLUS (www.ywca.org/html/B4d1.asp)

What is the American Cancer Society doing about breast cancer?

The American Cancer Society is involved in the fight against breast cancer in many areas. Through its extramural research grants program, the Society currently (July 2003) funds 166 research projects relating to breast cancer, totaling almost $80 million. A few areas of research now being investigated by American Cancer Society grantees are:

- Antiangiogenesis drugs that block the supply of new blood vessels to breast tumors
- How differences in the ability to metabolize alcohol influence breast cancer risk
- How a woman's genetic makeup determines her response to treatment
- New molecular targets for anticancer drugs
- Combination gene-immunotherapy
- The effect of presurgery hypnosis on side effects, recovery, and cost of breast cancer treatment
- The psychosocial needs of American Indian women with breast cancer
- Barriers facing the elderly in accessing clinical trials

The Society also conducts epidemiologic studies of breast cancer and performs surveillance research to monitor long-term trends and statistics. Using information collected from over 600,000 women in the Cancer Prevention Study II, American Cancer Society epidemiologists have studied the influence of many risk factors including alcohol consumption, diethylstilbestrol, estrogen replacement therapy, family history of cancer, obesity, smoking, and spontaneous abortion on the risk of death from breast cancer. American Cancer Society epidemiologists have also studied the influence of mammography on breast cancer prognostic factors, conducted long-term follow up of major breast cancer screening studies, and recommended breast cancer surveillance strategies that can be applied at local and national levels. In addition, the American Cancer Society Behavioral Research Center is currently conducting a study of cancer survivors to examine the determinants of a good quality of life following a breast cancer diagnosis. Specific areas of interest include identifying the unmet needs of cancer survivors, the use

of complementary therapies, and the needs of minority women with breast cancer.

The Society has a strong advocacy program through which it works with other organizations, such as National Alliance of Breast Cancer Organizations (NABCO) and the Susan G. Komen Foundation, in order to speak with one voice about the importance of increased government funding for breast cancer research; access to screening, quality treatment, and care for all women; protection from discrimination for women who may have a genetic predisposition for breast cancer; and concerns of breast cancer patients and survivors. Collaborative relationships and partnerships are established to achieve goals greater than could be achieved individually.

The American Cancer Society devotes significant resources to the education of the public and of health care professionals. Educational partnerships with organizations such as the American Association of Retired Persons, as well as public outreach, are performed to encourage more women to take advantage of mammography and clinical breast examinations, and to provide comprehensive information on all aspects of breast cancer.

Sources of Statistics

General Information. The statistics and statements in this booklet, unless otherwise stated, refer to invasive (not in situ) breast cancer. Except for rates designated as age-specific, all incidence rates and death rates in this booklet are age-adjusted to the 2000 US standard population.

Age Adjustment to the Year 2000 Standard. In this issue of *Breast Cancer Facts & Figures 2003-2004*, we used the most recent US census (2000) as the basis for calculating age-adjusted rates. This is a change from previous issues. Formerly, our statistics were age-adjusted to the 1970 census. This change has also been adopted by federal agencies that publish statistics. It also requires a recalculation of age-adjusted rates for previous years to allow valid comparisons between current and past years. The purpose of shifting to the Year 2000 Standard is to more accurately reflect contemporary incidence and mortality rates, given the aging of the population. Using the Year 2000 Standard in age-adjustment instead of the 1970 Standard allows age-adjusted rates to be closer to the actual, unadjusted rate in the population. Rates standardized to the 2000 Standard are 20%-30% higher than rates age-adjusted to the 1970 Standard.

Cancer Deaths. The estimated number of US breast cancer deaths in 2003 is calculated by fitting the numbers of cancer deaths from 1979 through 2000 to a statistical forecasting model. Data on the number of deaths are obtained from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention.

New Cancer Cases. The estimated number of new US breast cancer cases in 2003 is calculated by fitting the estimated numbers of cancer cases that occurred each year in the US from 1979 through 1999 to a statistical forecasting model. Estimates of the numbers of US cancer cases from 1979 through 1999 are used because case data are not available for all regions of the country. The estimated numbers of US cases from 1979 through 1999 are extrapolated from numbers of cases occurring in regions of the United States included in the Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute and census data.

Death Rates. Death rates are defined as the number of people per 100,000 who die from a disease during a one-year interval. Death rates used in this publication were previously made available by SEER on their Web site, www-seer.ims.nci.nih.gov, within the *SEER Cancer Statistics Review 1975-2000* and other Web documents.[2,107] Death rates were calculated using data on cancer deaths compiled by NCHS and population data collected by the US Bureau of the Census. All death rates in this publication were age-adjusted to the 2000 US standard population.

Incidence Rates. Incidence rates are defined as the number of people per 100,000 who develop disease during a one-year interval. When referenced as such, US SEER incidence rates were previously made available on their Web site, www-seer.ims.nci.nih.gov, within the *SEER Cancer Statistics Review 1975-2000* and other Web documents.[2,107] When not referenced otherwise, US SEER incidence rates are based on American Cancer Society analysis of the SEER Public Use Dataset, 1973-2000, April 2003 submission, using *SEER*Stat 5.0.17*, a statistical software package from the National Cancer Institute.[1] State incidence rates were previously published in *Cancer in North America, 1996-2000*, a publication of the North American Association of Central Cancer Registries.[3] (These rates were calculated using data on cancer cases collected by the SEER and National Program of Cancer Registries programs and population data collected by the US Bureau of the Census.) Except for the age-specific incidence rates described in Figure 1, all incidence rates in this publication are age-adjusted to the 2000 US standard population.

Annual Percent Change in Incidence Rates. When not referenced otherwise, annual percent changes in the incidence rate were estimated based on American Cancer Society analysis of the SEER Public Use Dataset, 1973-2000, April 2003 submission, using *SEER*Stat 5.0.17*.[1]

Survival Rates. A survival rate represents the proportion of patients who remain alive at some given amount of time since their diagnosis, such as 5 years. To adjust for normal life expectancy (factors such as dying of heart disease, accidents, and diseases of old age), a *relative survival rate* is calculated. The relative survival rate is obtained by dividing the observed survival among a group of cancer patients by the expected survival for persons in the general population who are similar to the patient group with respect to age, gender, race, and calendar year of observation. All survival statistics presented in this publication were originally published in the *SEER Cancer Statistics Review, 1975-2000*.[2] All 5-year survival statistics are based on cases diagnosed 1992-1999 with follow up of patients through 2000.

Probability of Developing Cancer. Probabilities of developing breast cancer were calculated using *DEVCAN* (Probability of DEVeloping CANcer Software), developed by the National Cancer Institute.[108] These probabilities reflect the average experience of women in the United States and do not take into account individual behaviors and risk factors (e.g., utilization of mammography screening and family history of breast cancer).

Prevalence of Mammography. The prevalence of mammography by age and state was obtained through analysis of data from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an ongoing system of surveys conducted by the state health departments in cooperation with the Centers for Disease Control and Prevention.[76] The prevalence of mammography by race/ethnicity is from the National Health Interview Survey.

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