Breast Cancer Facts & Figures 2007-2008

American Cancer Society®

Table of Contents

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 eventually 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 masses are benign; that is, they are not cancerous, do not grow uncontrollably or spread, and are not life-threatening.
- Some breast cancers are called in situ because they 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.
- Most 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 glandular walls to invade the surrounding tissue of the breast.

The seriousness of invasive breast cancer is strongly influenced by the stage of the disease – the extent or spread of the cancer when it is first diagnosed. There are two main staging systems for cancer. The American Joint Committee on Cancer's classification of tumors uses information on tumor size (T), lymph node involvement (N), and the presence or absence of distant metastases (M), and is commonly used in clinical settings.[1] Once the T, N, and M are determined, a stage of I, II, III, or IV is assigned, with stage I being an early stage and stage IV being the most advanced.

A simpler system used for staging cancers is known as the SEER Summary Stage system and is used more commonly in reporting to cancer registries and for public health research and planning.[2] According to this system:

– Local-stage tumors are cancers confined to the breast.

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

– Distant-stage cancers 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 more than 1 in 4 cancers diagnosed in US women.
- Men are generally at low risk for developing breast cancer; however, they should report any change in their breasts to a physician.

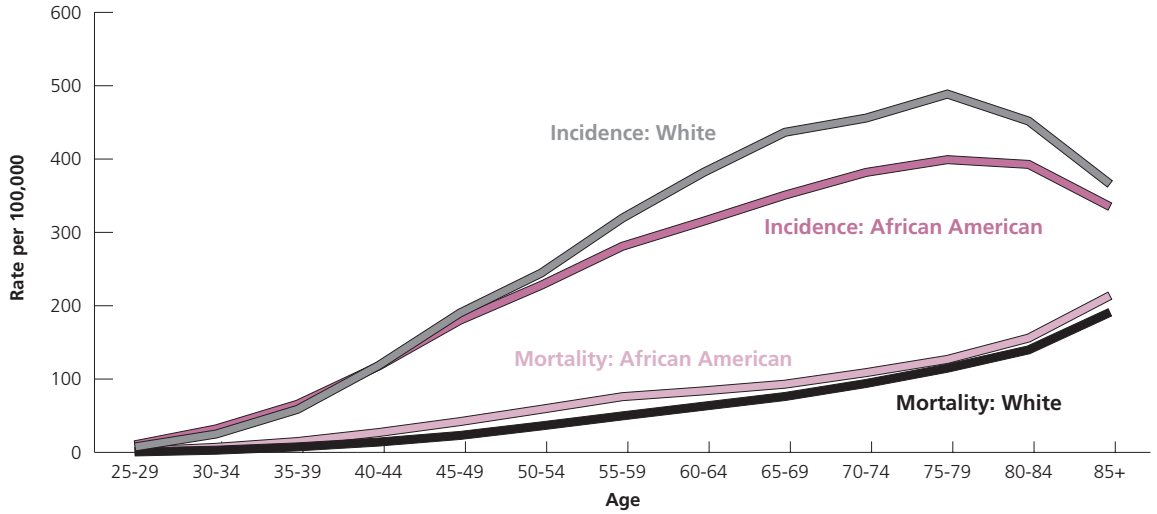
Age

- Breast cancer incidence and death rates generally increase with age (Figure 1, page 2). During 2000-2004, 95% of new cases and 97% of breast cancer deaths occurred in women aged 40 and older.
- During 2000-2004, women aged 20-24 years had the lowest breast cancer incidence rate, 1.4 cases per 100,000 women, and women aged 75-79 years had the highest incidence rate, 464.8 cases per 100,000.[3] The decrease in age-specific incidence rates that occurs in women aged 80 years and older (Figure 1, page 2) may reflect lower rates of screening, the detection of cancers by mammography before age 80, and incomplete detection.
- During 2000-2004, the median age at the time of breast cancer diagnosis was 61 years.[3] This means that 50% of women who developed breast cancer were aged 61 or younger and 50% were older than age 61 when diagnosed.

Race/ethnicity

- White women have a higher incidence of breast cancer than African American women after age 40. In contrast, African American women have a higher incidence rate before age 40 and are more likely to die from breast cancer at every age (Figure 1, page 2).
- Table 1 (page 3) shows breast cancer incidence and death rates per 100,000 for white and African American women by state. Among white women, breast cancer incidence rates range from 105.0 in Mississippi to 153.0 in the District of Columbia.[4] Breast cancer incidence rates among African American women range from 68.5 in New Mexico to 129.8 in Kentucky.[4] Incidence rates reflect how completely the population is screened, as well as disease occurrence.
- Incidence and death rates from breast cancer are lower among women of other racial and ethnic groups than among white and African American women (Figure 2, page 4).

Figure 1. Female Breast Cancer – Incidence and Mortality Rates by Age and Race, US, 2000-2004



Data sources: Incidence – Surveillance, Epidemiology, and End Results (SEER) Program, SEER 17 Registries, 2000-2004, Division of Cancer Control and Population Science, National Cancer Institute, 2007. Mortality – National Center for Health Statistics, Centers for Disease Control and Prevention, 2007.

American Cancer Society, Surveillance Research, 2007

Despite higher incidence rates, breast cancer death rates are lower among white women than among African American women. Breast cancer death rates among white women range from 22.3 in Alaska to 28.3 in New Jersey. In contrast, breast cancer death rates among African American women range from 19.6 in Oregon to 40.3 in Louisiana and Nebraska.

How many cases and deaths are estimated to occur in 2007?

- In 2007, an estimated 178,480 new cases of invasive breast cancer will be diagnosed among women, as well as an estimated 62,030 additional cases of in situ breast cancer (Table 2, page 4).[5] The expected number of new breast cancers in 2007 is markedly lower than the estimate for 2005 in the previous *Breast Cancer Facts & Figures* report due to the use of a new, more accurate estimation method and a small decline in the breast cancer incidence rate. For additional information, see Sources of Statistics, page 25.
- In 2007, approximately 40,460 women are expected to die from breast cancer (Table 2, page 4). Only lung cancer accounts for more cancer deaths in women.[5]
- In 2007, about 2,030 cases of breast cancer are expected to occur among men, accounting for about 1% of all breast cancers.[5] Approximately 450 men will die from breast cancer.

How many women alive today have ever had breast cancer?

The National Cancer Institute estimates that approximately 2.4 million women with a history of breast cancer were alive in January 2004.[3] Most of these women were cancer-free, while others still had evidence of cancer and may have been undergoing treatment.

How has the occurrence of breast cancer changed over time?

Incidence trends – women

Invasive breast cancer

Since broad surveillance of cancer began in 1975, incidence rates of invasive female breast cancer for all races combined show four distinct phases:

- Between 1975-1980, incidence rates were essentially constant.
- Between 1980-1987, incidence rates increased by 3.7% per year.
- Between 1987-2001, incidence rates increased by 0.5% per year.
- Between 2001-2004, incidence rates decreased by 3.5% per year.[3]

Much of the long-term underlying increase in incidence is attributed to changes in reproductive patterns, such as delayed childbearing and having fewer children, which are recognized risk factors for breast cancer. The rapid increase between 1980-1987 is due largely to greater use of mammography screening and increased early detection of breast cancers too small to be felt. Detecting these tumors earlier has the effect of inflating the incidence rate because tumors are being detected 1 to 3 years before they become symptomatic. During the introduction of mammography, from 1980-1987, incidence rates of smaller tumors (≤2.0 cm) more than doubled, while rates of larger tumors (≥3.0 cm) decreased 27%.[6]

The slight increase in overall breast cancer incidence during the 1990s may reflect increases in the prevalence of mammography screening, obesity, and the use of hormone replacement therapy (HRT). The decline in breast cancer incidence beginning around 2000 is likely due to a decrease in mammography screening (thus detecting fewer cancers earlier) as well as decreased use of HRT following the publication of the results of the Women's Health Initiative randomized trial in 2002.[7-10] The percentage of women aged 40 and older who reported having a mammogram within the past 2 years dropped from 70% in 2000 to 66% in 2005.[9] The decrease in breast cancer incidence rates due to lower prevalence of mammography use gives the appearance of a decline in the rate of disease, but in fact reflects under-diagnosis or delayed diagnosis and not a true decrease in disease occurrence. The sharp decrease in breast cancer incidence rates that occurred between 2002 and 2003,

Table 1. Female Breast Cancer Incidence and Mortality Rates* by Race and State, 2000-2004

	White		African American			White		African American	
State	Incidence	Mortality	Incidence	Mortality	State	Incidence	Mortality	Incidence	Mortality
Alabama	115.6	24.5	103.8	31.6	Montana	122.9	24.0	§	‡
Alaska	132.4	22.3	117.7	30.0	Nebraska	131.2	23.2	103.2	40.3
Arizona†	116.6	23.6	80.6	36.9	Nevada	124.9	26.8	104.7	29.6
Arkansas†	117.4	22.8	102.3	34.9	New Hampshire	133.9	24.9	96.3	‡
California	133.3	25.0	118.1	33.7	New Jersey	136.7	28.3	111.7	34.6
Colorado	129.9	23.4	100.1	21.7	New Mexico	118.3	23.4	68.5	24.8
Connecticut	139.9	25.2	112.9	26.9	New York	130.9	26.4	97.0	29.1
Delaware	126.9	25.3	117.5	32.7	North Carolina	§	23.5	§	33.4
Dist. of Columbia	153.0	26.7	122.9	36.1	North Dakota	122.2	24.1	§	‡
Florida	122.0	22.8	101.7	30.5	Ohio	120.9	27.2	113.6	36.2
Georgia	127.8	24.0	113.3	30.8	Oklahoma	127.6	25.6	117.6	37.9
Hawaii	144.8	22.9	74.7	‡	Oregon	137.7	25.5	114.4	19.6
Idaho	124.2	23.7	§	‡	Pennsylvania	127.1	26.9	117.3	35.7
Illinois	127.3	25.5	119.2	38.9	Rhode Island	131.3	24.3	88.7	26.7
Indiana	121.2	25.7	109.6	34.2	South Carolina	124.1	23.2	109.7	33.4
Iowa	125.7	23.4	109.3	37.2	South Dakota†	126.7	24.0	§	‡
Kansas	§	24.6	§	37.9	Tennessee†	114.7	25.0	106.6	35.6
Kentucky	121.0	25.5	129.8	36.6	Texas	117.3	23.6	114.9	36.2
Louisiana	121.6	25.7	123.7	40.3	Utah	117.5	23.2	82.9	‡
Maine	130.2	23.7	101.7	‡	Vermont	§	26.0	§	‡
Maryland	§	25.9	§	34.0	Virginia†	122.9	25.4	116.7	37.1
Massachusetts	138.9	26.0	95.2	26.3	Washington	143.0	24.3	111.4	29.7
Michigan	129.9	24.6	119.0	35.0	West Virginia	115.9	25.2	101.6	36.2
Minnesota	§	24.1	§	26.1	Wisconsin†	129.3	24.3	116.0	28.6
Mississippi†	105.0	24.1	102.7	36.3	Wyoming	120.0	23.5	115.0	‡
Missouri	125.0	25.7	117.2	36.5					

*All rates are per 100,000 and age-adjusted to the 2000 US standard population. †Case ascertainment not complete for all years. ‡Fewer than 10 deaths; statistic could not be calculated. §Statistic could not be calculated for one of the following reasons: data were not submitted to NAACCR, data failed to meet NAACCR quality standards, or 6 or fewer cases were reported.

Data sources: Incidence – Cancer in North America, 2000-2004. Volume One: Incidence, NAACCR, 2007. Data are collected by cancer registries participating in the National Cancer Institute's SEER Program and the Centers for Disease Control and Prevention's National Program of Cancer Registries. Mortality – National Center for Health Statistics, Centers for Disease Control and Prevention, 2007.

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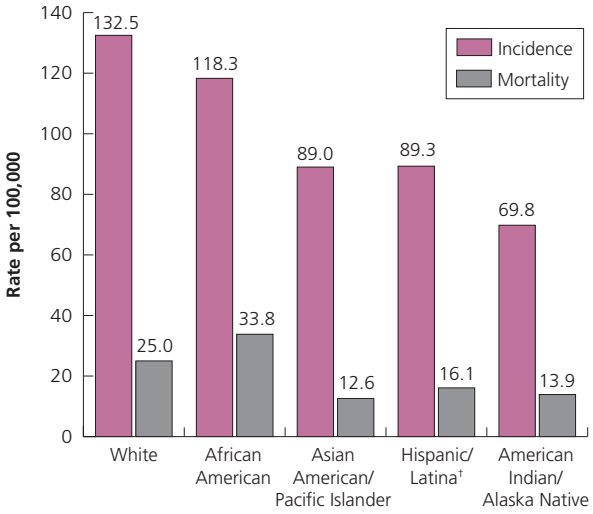
Figure 2. Female Breast Cancer Incidence and Mortality Rates* by Race and Ethnicity, US, 2000-2004



*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 (SEER) Program, SEER 17 Registries, 2000-2004, Division of Cancer Control and Population Science, National Cancer Institute, 2007. Incidence data for Hispanics exclude cases from the Alaska Native Registry and Kentucky. Mortality – National Center for Health Statistics, Centers for Disease Control and Prevention, 2007. For Hispanics, information is included for all states except Minnesota, New Hampshire, and North Dakota.

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particularly among women aged 50-69 years, in whom HRT use is most common, is likely a result of the rapid drop in HRT use that began in 2002.

Figure 3a (page 5) presents incidence trends by tumor size for the most recent period. From 1988-2000, the trend in diagnosis of smaller (≤2.0 cm) tumors among women of all races continued to increase by 2.0% per year. Since 2000, the incidence rate of smaller tumors has declined by 3.8% per year. In contrast, the incidence rate of larger tumors (>5.0 cm) has increased since 1992 by 1.7% per year. This increase may reflect the higher prevalence of some underlying risk factor such as postmenopausal obesity, HRT use, or both.

Incidence rates of breast cancer 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 (2.1-5.0 and >5.0 cm) than white women (Figure 3a, page 5).

Figure 3b (page 5) presents incidence trends by stage at diagnosis. Incidence rates of localized breast cancer increased through most of the 1980s and 1990s but began to decline by 2.9% per year in 1999. The incidence of regional-stage disease increased during 1994-2001 and has since decreased on average by 3.7% per year. Incidence rates of distant-stage disease have remained stable.

Age

During the early 1980s, incidence rates of invasive breast cancer increased among both women aged 50 and older, and those younger than 50 (5.8% per year and 2.9% per year, respectively) (Figure 4, page 6).[3] Among women aged 50 and older, incidence rates continued to increase at a much slower rate during 1986-2001 and have since been declining sharply (4.8% per year). Among women younger than age 50, incidence rates have remained stable since 1986.

Race/ethnicity

Figure 5 (page 7) presents trends in invasive female breast cancer incidence rates by race and ethnicity. Incidence data are available for African American and white women since the early 1970s. Among white women, breast cancer incidence rates increased rapidly through 1987 (largely due to the introduction of mammography screening) and then continued to increase at a slower rate until 2001. During 2001-2004, breast cancer incidence rates among white women declined at an average rate of 3.7% per year. The recent decline is likely due to lower rates of mammography screening as well as decreased use of HRT.[8-10] Incidence rates also increased for African American women until 1992; however, they have since remained relatively stable. The lack of a decline in incidence among African American women may be due to the lack of a significant

Table 2. Estimated New Female Breast Cancer Cases and Deaths by Age, US, 2007*

Age	In Situ Cases	Invasive Cases	Deaths
Younger than 45	7,640	16,150	2,830
45 and older	54,390	162,330	37,630
Younger than 55	24,920	54,180	9,140
55 and older	37,110	124,300	31,320
Younger than 65	40,520	105,960	16,950
65 and older	21,510	72,520	23,510
All ages	**62,030**	**178,480**	**40,460**

*Rounded to the nearest 10.

Data source: Estimated cases are based on 1995-2003 incidence rates from 41 states as reported by the North American Association of Central Cancer Registries (NAACCR), representing about 86% of the US population. Estimated deaths are based on data from US Mortality Public Use Data Tapes, 1969-2004, National Center for Health Statistics, Centers for Disease Control and Prevention, 2007.

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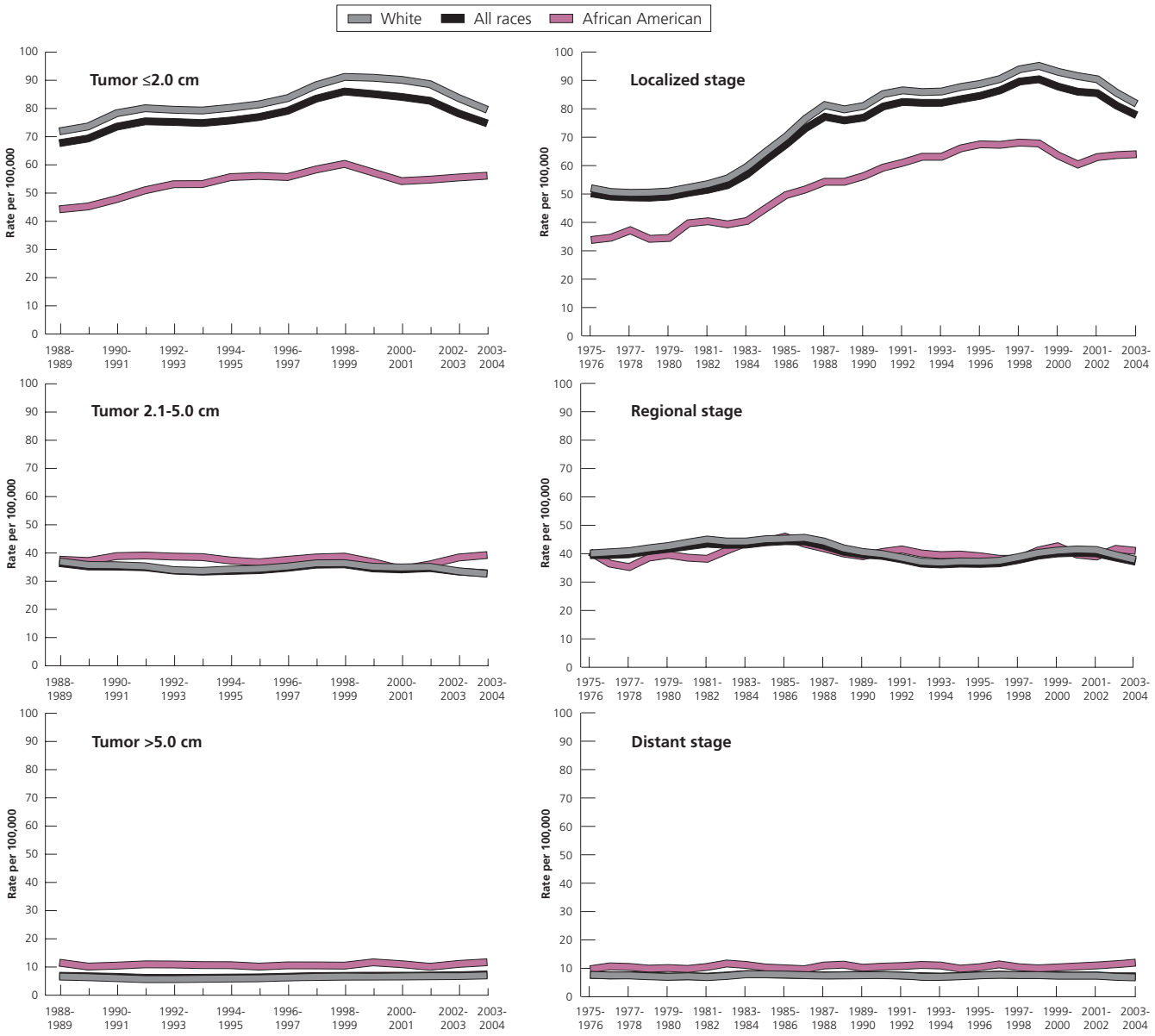
Figure 3a. Trends in Female Breast Cancer Incidence Rates* by Tumor Size and Race, US, 1988-1989 to 2003-2004

Figure 3b. Trends in Female Breast Cancer Incidence Rates* by Stage and Race, US, 1975-1976 to 2003-2004



*Rates are two-year moving averages and are age-adjusted to the 2000 US standard population.

Data source: Surveillance, Epidemiology, and End Results (SEER) Program, SEER 9 Registries, 1973-2004, Division of Cancer Control and Population Science, National Cancer Institute, 2007.

American Cancer Society, Surveillance Research, 2007

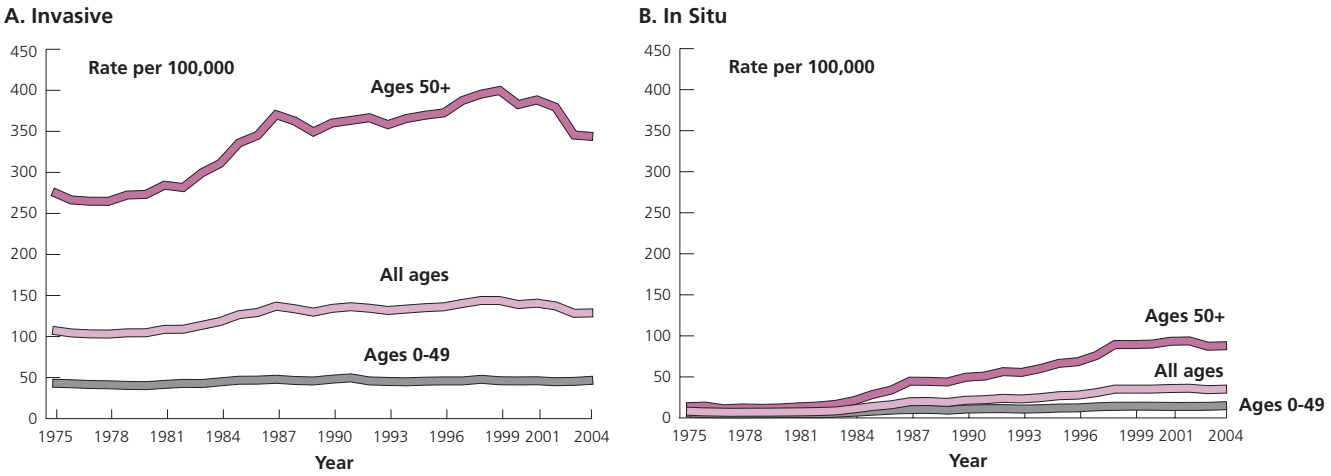
decrease in mammography screening rates and/or lower rates of HRT use.[8-10]

Incidence data are available for women of other races and ethnicities only since 1992. During 1992-2004, incidence rates decreased among American Indians/Alaska Natives (1.5% per year) and did not change significantly among Asian Americans/Pacific Islanders or Hispanics/Latinas.[11]

In situ breast cancer

Incidence rates of in situ breast cancer increased rapidly during the 1980s and 1990s, largely because of increased diagnosis by mammography. The increase was observed in all age groups, although it was greatest in women aged 50 and older.[12] Since 2000, incidence rates of in situ breast cancer have leveled off among women aged 50 and older, although they have continued to increase in younger women (Figure 4, page 6).[3] The incidence rate

Figure 4. Incidence Rates* of Invasive and In Situ Female Breast Cancer by Age, Adjusted for Delayed Reporting, US, 1975-2004



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

Data source: Surveillance, Epidemiology, and End Results (SEER) Program, SEER 9 Registries, 1973-2004, Division of Cancer Control and Population Science, National Cancer Institute, 2007.

American Cancer Society, Surveillance Research, 2007

plateau in women aged 50 and older may reflect the reduction in mammography screening since 2000.

Most in situ breast cancers are ductal carcinoma (DCIS), which accounted for about 80% of in situ breast cancers diagnosed from 2000-2004. DCIS is detected by mammography, and the large increase in incidence is a direct result of mammography's ability to detect cancers that cannot be felt.

Lobular carcinoma in situ (LCIS) is less common than DCIS, accounting for about 10% of female in situ breast cancers diagnosed from 2000-2004. Similar to DCIS, the overall incidence rate of LCIS has increased more rapidly than the incidence of invasive breast cancer. This increase was limited to women older than age 40 and largely to postmenopausal women.[12]

Mortality trends – women

The death rate from breast cancer in women has decreased since 1990:

- Between 1975-1990, the death rate for all races combined increased by 0.4% annually.
- Between 1990-2004, the rate decreased by 2.2% annually.[3]

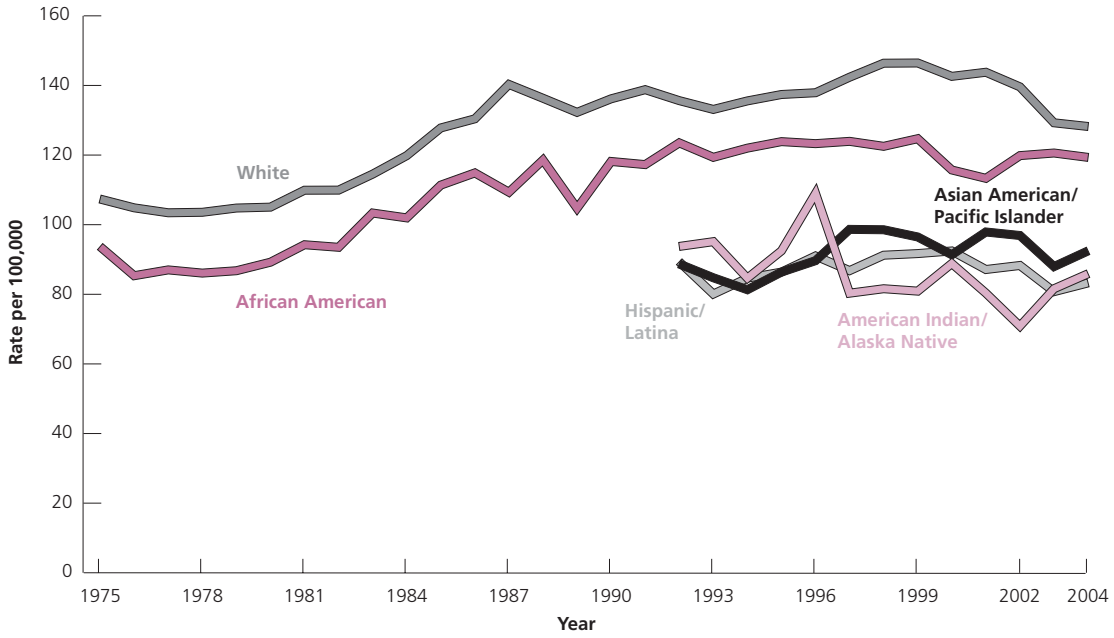
The decline was larger among younger age groups. From 1990-2004, death rates decreased by 3.3% per year among women younger than 50, and by 2.0% per year among women 50 and older.[3] The decline in breast cancer mortality since 1990 has been attributed to both improvements in breast cancer treatment and to early detection.[13]

African American women and women of other racial and ethnic groups have benefited less than white women from these advances. From 1995-2004, female breast cancer death rates declined by 2.4% per year in whites and Hispanics/Latinas, 1.6% per year in African Americans, and remained unchanged among Asian Americans/Pacific Islanders and American Indians/Alaska Natives.[3] A striking divergence in long-term mortality trends is seen between African American and white females (Figure 6, page 7). The disparity in breast cancer death rates between African American and white women began in the early 1980s; by 2004, death rates were 36% higher in African Americans than in white women.

Incidence and mortality trends – men

Although breast cancer in men is a rare disease (accounting for approximately 1% of breast cancer cases in the US), the incidence rate among males increased 1.0% annually between 1975-2004 (Figure 7, page 8). The reasons for the increase are unknown and are not likely to be attributable to increased detection. Similar to female breast cancer, the incidence of male breast cancer increases with age.[14] Men are more likely than women to be diagnosed with advanced disease and thus have poorer survival.[14] Late-stage diagnoses are more common in men because they may not be aware of, or respond as quickly to, changes in their breasts and because they are not screened for breast cancer. Mammography is not recommended for men because breast cancer in men is rare. Death rates from male breast cancer have remained essentially constant since 1975 (Figure 7, page 8).

Figure 5. Trends in Female Breast Cancer Incidence Rates* by Race and Ethnicity, US, 1975-2004



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

Data source: Surveillance, Epidemiology, and End Results (SEER) Program, 1973-2004, Division of Cancer Control and Population Science, National Cancer Institute, 2007. Data for whites and African Americans are from the SEER 9 registries. Data for other races/ethnicities are from the SEER 13 registries. For Hispanics, incidence data do not include cases from the Alaska Native Registry, Hawaii, and Seattle. Incidence data for American Indians/Alaska Natives are based on Contract Health Service Delivery Area (CHDSA) counties.

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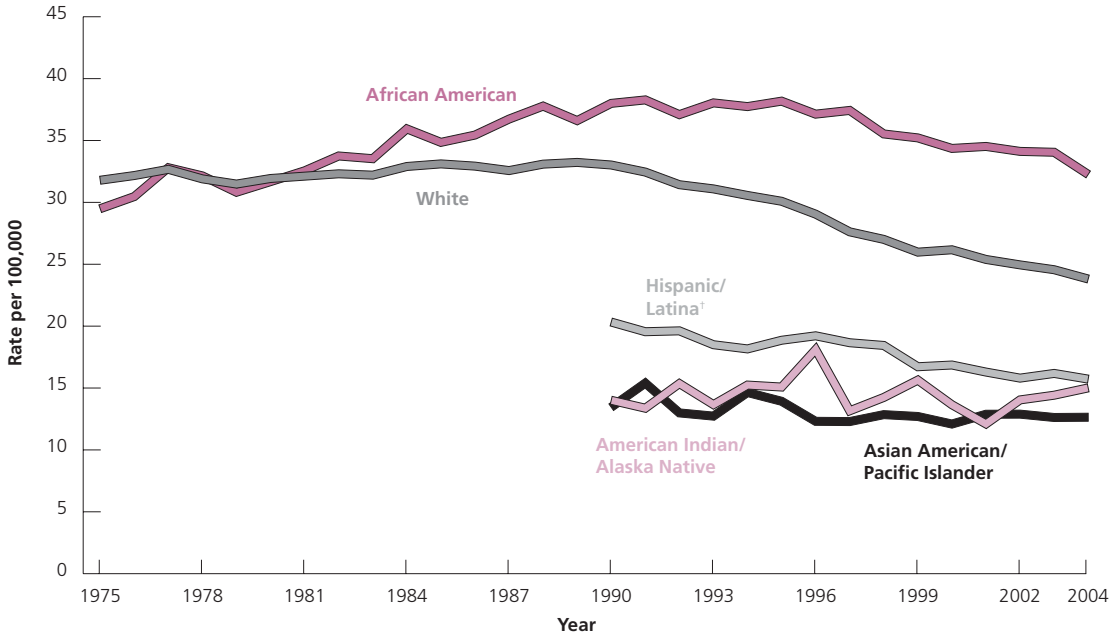
Figure 6. Trends in Female Breast Cancer Death Rates* by Race and Ethnicity, US, 1975-2004



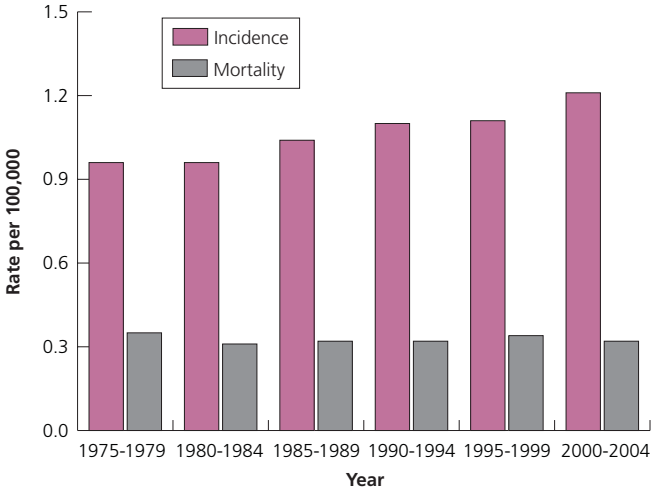
*Rates are age-adjusted to the 2000 US standard population.

†Information is included for all states except Connecticut, Louisiana, Maine, Maryland, Minnesota, New Hampshire, New York, North Dakota, Oklahoma, Virginia, and Vermont.

Data source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2007.

American Cancer Society, Surveillance Research, 2007

Figure 7. Trends in Male Breast Cancer Incidence and Mortality Rates*, US, 1975-2004



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

Data sources: Incidence – Surveillance, Epidemiology, and End Results (SEER) Program, SEER 9 Registries, 1973-2004, Division of Cancer Control and Population Science, National Cancer Institute, 2007. Mortality – National Center for Health Statistics, Centers for Disease Control and Prevention, 2007.

American Cancer Society, Surveillance Research, 2007

Due to the rarity of male breast cancer, much less is known about the disease than is known about female breast cancer. Risk factors include BRCA2 gene mutations, Klinefelter syndrome, testicular disorders, family history of male or female breast cancer, and obesity.[15]

What factors influence breast cancer survival?

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

- 89% at 5 years after diagnosis;
- 81% after 10 years;
- 73% after 15 years.

Caution should be used when interpreting long-term survival rates since they reflect the experience of women treated using past therapies and do not reflect recent trends in early detection or advances in treatment.

Stage at diagnosis

Five-year relative survival is lower among women with a more advanced stage at diagnosis (Figure 8, page 9). Considering all races, 5-year relative survival is 98% for localized disease, 84% for regional disease, and 27% for distant-stage disease.[3] Larger tumor size at diagnosis is also associated with decreased survival.[16,17] For example, among women of all races with regional disease, the 5-year relative survival is 94% for tumors less than or equal to 2.0 cm, 80% for tumors 2.1-5.0 cm, and 66% for tumors greater than 5.0 cm.

Age at diagnosis

The 5-year relative survival rate is slightly lower among women diagnosed with breast cancer before age 40 (82%) compared to women diagnosed at ages 40 and older (89%). Tumors diagnosed in younger women may be more aggressive and less responsive to treatment.[18-21]

Race/ethnicity and socioeconomic factors

African American women with breast cancer are less likely than white women to survive 5 years: 77% versus 90%, respectively.[3] This difference can be attributed to both later stage at detection and poorer stage-specific survival (Figure 8, page 9).

A lack of health insurance is associated with more advanced stage at diagnosis.[22] Moreover, breast cancer patients with lower incomes have lower 5-year relative survival rates than higher-income patients at every stage of diagnosis.[23-25] 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 between African American and white women.[26-31] Aggressive tumor characteristics associated with poorer prognosis appear to be more common in African American women and may also contribute to their lower survival rates.[32,33]

What are the known risk factors for breast cancer?

Many of the known breast cancer risk factors, such as age, family history, age at first full-term pregnancy, early menarche, late menopause, and breast density, are not easily modifiable. However, other factors associated with increased breast cancer risk (postmenopausal obesity, use of post-menopausal hormones, alcohol consumption, and physical inactivity) are modifiable. Some risk factors directly increase lifetime exposure of breast tissue to circulating ovarian hormones (early menarche, late menopause, obesity, and hormone use), whereas others, such as higher socioeconomic status, are only correlates of reproductive behavior or other factors. Established risk factors for breast cancer are listed in Table 3 (page 10) in order of the strength of their association.

The desire to explain the causes of breast cancer in more simple, direct terms has led to a wide range of proposed

explanations, from underwire bras to antiperspirants. At present, there is no scientific evidence that shows an association between these products and breast cancer.[34] Likewise, breast implants have not been associated with an increased risk of breast cancer.[35] There are also claims that women who have had an abortion are at an increased risk for developing breast cancer; however, there is a large body of evidence refuting this hypothesis. A recent review by a panel of experts convened by the National Cancer Institute concluded that there is no association between medical abortion and breast cancer.[36] Subsequent to that review, results of a study that followed more than 100,000 nurses from 1993-2003 also found no link between breast cancer and a previous abortion, either spontaneous or induced.[37]

Despite concern that rising breast cancer incidence in the latter half of the 20th century may be caused by environmental pollutants, such as organochlorine pesticides, studies to date have not found an association between increased concentrations of organochlorines measured in adults and breast cancer.[38,39] Although animal studies have demonstrated that prolonged high-dose exposure to many industrial chemicals can increase mammary tumors,[40] there are no current methods to determine whether the much lower concentrations of these chemicals that occur – alone or in combination, in air, drinking water, or consumer products – increase the risk of human breast cancer. In general, epidemiological studies have not found clear relationships between environmental pollutants and breast cancer, but these studies have had limited capability to study effects on subgroups of the population or to quantify exposures at potentially critical periods of life, such as adolescence.

Increasing age

Besides being female, age is the most important risk factor for breast cancer.[41] Table 4 (page 11) shows a woman's risk of developing breast cancer at different ages. These probabilities are averages for the whole population. An individual woman's breast cancer risk may be higher or lower depending on her personal risk factors, experiences, and other factors not yet fully understood.

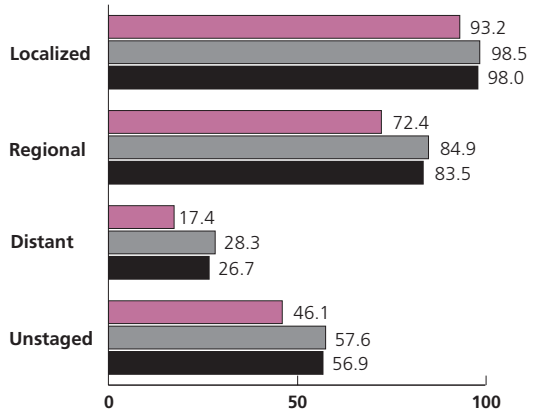
Currently, a woman living in the US has a 12.3% (1 in 8) lifetime risk of developing breast cancer. In the 1970s, the lifetime risk of being diagnosed with breast cancer was 1 in 11. This increase is due to longer life expectancy, as well as increases in breast cancer incidence due in part to long-term HRT use and the rising prevalence of obesity. Lifetime risk reflects a woman's risk over an entire lifetime and should not be confused with risk over a shorter time period.

Family history of breast cancer/ genetic predisposition

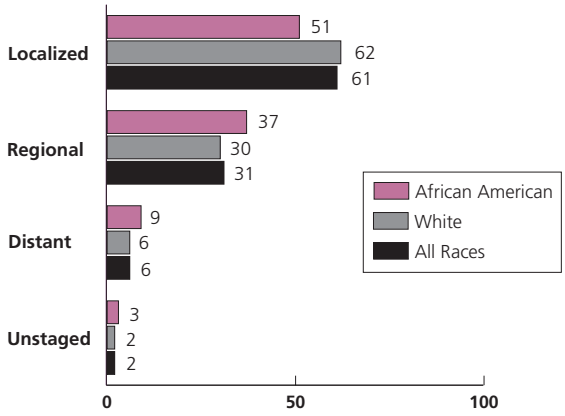
Women with a family history of breast cancer, especially in a first-degree relative (mother, sister, or daughter), have an increased risk of developing breast cancer.[42] The risk is higher if more than one first-degree relative has developed breast cancer and increases the younger the relative was at the time of diagnosis. Women with a family history of breast or ovarian cancer in their aunts,

Figure 8. Female Breast Cancer – US, 1996-2003

A. Five-Year Survival Rates* by Stage at Diagnosis and Race (%)



B. Percent Diagnosed by Stage and Race



*Survival rates are based on patients diagnosed between 1996-2003 and followed through 2004.

Data source: Surveillance, Epidemiology, and End Results (SEER) Program, SEER 17 Registries, 1973-2004, Division of Cancer Control and Population Sciences, National Cancer Institute, 2007.

American Cancer Society, Surveillance Research, 2007

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

Relative Risk	Factor
>4.0	• Female • Age (65+ versus <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 • High breast tissue density • Biopsy-confirmed atypical hyperplasia
2.1-4.0	• One first-degree relative with breast cancer • High-dose radiation to chest • High bone density (postmenopausal)
1.1-2.0	
Factors that affect circulating hormones	• Late age at first full-term pregnancy (>30 years) • Early menarche (<12 years) • Late menopause (>55 years) • No full-term pregnancies • Never breastfed a child • Recent oral contraceptive use • Recent and long-term use of hormone replacement therapy • Obesity (postmenopausal)
Other factors	• Personal history of endometrium, ovary, or colon cancer • Alcohol consumption • Height (tall) • High socioeconomic status • Jewish heritage

Adapted with permission from Hulka et al, 2001.

mothers, sisters, or daughters should discuss this history with their physicians.

It is estimated that 5% to 10% of breast cancer cases result from inherited mutations or alterations in the breast cancer susceptibility genes, BRCA1 and BRCA2.[43] These mutations are present in far less than 1% of the general population.[44]

From population-based studies, women with BRCA1 mutations are estimated to have a 65% risk for developing breast cancer by age 70; the corresponding risk for BRCA2 mutations is 45%.[45]

Molecular tests are commercially available to identify some of the BRCA mutations responsible for inherited forms of breast cancer, yet the interpretation of these tests and treatment decisions remains complicated.[46] 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, the 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 make a decision about testing. People should understand and carefully weigh the benefits and potential consequences of genetic testing before these tests are done.

While a family history of breast cancer suggests an inherited influence on disease risk, not all familial risk results from a BRCA1 or BRCA2 mutation. Scientists believe that most of the occurrence of breast cancer in families results from the interaction between lifestyle factors and low risk variations in genetic susceptibility that may be shared by women within a family.[47]

Hormonal factors

Reproductive hormones are thought to influence breast cancer risk through effects on cell proliferation and DNA damage, as well as promotion of cancer growth. Early menarche (<12 years), older age at menopause (>55 years), older age at first full-term pregnancy (>30 years), and fewer number of pregnancies may increase a woman's risk of breast cancer by affecting the levels of

reproductive hormones produced by her body.[48] Breastfeeding has consistently been shown to decrease a woman's risk of breast cancer with greater benefit associated with longer duration.[49,50] Recent use of oral contraceptives may slightly increase the risk of breast cancer; however, women who have stopped using oral contraceptives for 10 years or more have the same risk as women who have never used the pill.[51]

Recent use of combination hormone replacement therapy (HRT), which combines estrogen and progestin, has been shown to increase breast cancer risk, with higher risk associated with longer use.[52-54] Estrogen alone can be prescribed for women without a uterus. This is commonly known as estrogen replacement therapy (ERT or ET) and does not appear to increase the risk of developing breast cancer.[55-57]

Clinical factors

High breast tissue density (a mammographic indicator of the amount of glandular tissue relative to fatty tissue in the breast) has been shown to be a strong independent risk factor for the development of breast cancer. In several studies, women with the highest levels of breast density were found to have a 4- to 6-fold increased risk of breast cancer, compared with women with the least dense breasts.[58-61] For more information on the relationship between breast tissue density and breast cancer, see current research on early detection, page 20.

Some types of benign breast conditions are more closely linked to breast cancer risk than others.[62-64] Doctors often categorize benign breast conditions into 3 groups based on the degree of risk: non-proliferative lesions, proliferative lesions without atypia, and proliferative lesions with atypia. Non-proliferative lesions are not associated with any overgrowth of breast tissue and have little to no effect on breast cancer risk. Proliferative lesions without atypia (those with excessive growth of cells in the ducts or lobules of the breast tissue) seem to raise a woman's risk of breast cancer slightly (1.5 to 2 times normal). Proliferative lesions with atypia (those with excessive growth of cells in the ducts or lobules of the breast tissue and the cells no longer appear normal) have a stronger effect on breast cancer risk, raising it 4 to 5 times higher than normal. They include atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH). Women with a family history of breast cancer and either hyperplasia or atypical hyperplasia have an even higher risk of developing breast cancer.

To estimate 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://cancer.gov/bcrisktool/).

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

If current age is:	The probability of developing breast cancer in the next 10 years is:	or 1 in:
20	0.05%	1,837
30	0.43%	234
40	1.43%	70
50	2.51%	40
60	3.51%	28
70	3.88%	26
Lifetime risk	12.28%	8

*Among those free of cancer at beginning of age interval. Based on cases diagnosed 2002-2004. Percentages and "1 in" numbers may not be numerically equivalent due to rounding.

Data source: DevCan Software, Version 6.2.1.[165]

American Cancer Society, Surveillance Research, 2007

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 is to reduce her known risk factors as much as possible by avoiding weight gain and obesity, engaging in regular physical activity, and minimizing alcohol intake.[65] Women should consider the increased risk of breast cancer associated with HRT use when evaluating treatment options for menopausal symptoms. Treatment with tamoxifen or raloxifene can also reduce the risk of breast cancer among women at high risk (see page 12, section on chemoprevention).

Obesity

Obesity increases risk of postmenopausal (but not premenopausal) breast cancer, as does weight gain during adulthood.[67-71] A recent study found that women who gained 55 pounds or more after age 18 had almost 1.5 times the risk of breast cancer compared with those who maintained their weight. A gain of 22 pounds or more after menopause was associated with an increased risk of 18%, whereas losing at least 22 pounds after menopause and maintaining the weight loss was associated with 57% lower breast cancer risk.[71] In postmenopausal women, circulating estrogen is primarily produced in fat tissue. Thus, having more fat tissue increases estrogen levels and the likelihood of develop-

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 or protective 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, one study found current users of combination estrogen and progestin hormone replacement therapy (HRT) have a relative risk of developing breast cancer of 1.26, or a 26% increased risk.[54] 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 diagnosed over a period of 5.2 years.[66]

ing breast cancer. Given the large percentage of women in the US who are overweight or obese, strategies to maintain a healthy body weight are important to reduce the risk of both developing and dying from breast cancer.

Physical activity

Growing evidence supports a small protective effect of physical activity on breast cancer.[67,72-75] Although most studies find reduced risk in women who exercise vigorously for 45 to 60 minutes on 5 or more days per week, one study suggests that regular physical activity, regardless of intensity, may reduce the risk of breast cancer in postmenopausal women.[66,73] Overall, the protective effect of physical activity may be greatest 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.[67,76]

Alcohol consumption

Alcohol consumption is consistently associated with increased breast cancer risk.[77-80] A meta-analysis of more than 40 epidemiologic studies suggests that the equivalent of 2 drinks a day (or 24g of alcohol) may increase breast cancer risk by 21%. This increased risk is dose-dependent and exists regardless of the type of alcoholic beverage consumed. A recent review concluded that the most likely mechanism by which alcohol increases risk of breast cancer is by increasing estrogen and androgen levels.[81] Thus, reducing alcohol intake may be a useful strategy for reducing breast cancer risk among regular consumers of alcohol.

Tobacco

Most studies have found no link between active cigarette smoking and breast cancer.[78,82] Though both active smoking and secondhand smoke have been suggested to increase the risk of breast cancer in a number of studies that restrict the comparison group to women who report no exposure to secondhand smoke, this issue remains controversial.[82,83] The US Surgeon General has characterized the evidence linking secondhand smoke and breast cancer as "suggestive but not sufficient" to infer a causal relationship.[84] Regardless, not smoking cigarettes and avoiding exposure to secondhand smoke has multiple health benefits.

Hormone replacement therapy (HRT)

Use of combined HRT, also referred to as HT (hormone therapy) or EP (estrogen and progestin therapy), increases the risk of breast cancer, as well as the likelihood that cancer will be found at a more advanced stage.[85,86] HRT use may increase the risk of late-stage diagnoses by increasing breast tissue density, thereby reducing the effectiveness of mammograms.

The US Preventive Services Task Force has recommended against the routine use of HRT for the prevention of chronic diseases such as osteoporosis and heart disease in postmenopausal women.[87] However, if a woman and her doctor decide that HRT is appropriate to treat specific menopausal symptoms or health problems, it should be prescribed at the lowest effective dose and for as short a time as possible. A woman considering HRT should discuss the risks and benefits with her health care provider, as well as alternative treatment options.

Chemoprevention

The use of drugs to reduce the risk of disease is called chemoprevention. Several clinical studies have shown that, in women known to be at increased risk for breast cancer, the drugs tamoxifen and raloxifene may reduce this risk.[88-93]

Tamoxifen has been used for more than 30 years as a treatment for some breast cancers.[94] In 1998, a large randomized trial of more than 13,000 women first demonstrated that tamoxifen can also be used to reduce

the risk of invasive and in situ breast cancer in women at high risk for developing the disease, but the reduction in risk was limited to estrogen-receptor positive disease.[88] After an average of 7 years of follow up, breast cancer risk decreased by 42% in the group that received tamoxifen, with 25 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 involving more than 7,000 women.[92] After a median follow-up time of 8 years, breast cancer risk was reduced by 26% in the women who received tamoxifen, with 124 cases diagnosed among 3,579 women in the tamoxifen group, compared to 168 cases among 3,575 women in the group not receiving tamoxifen. These long-term, follow-up results indicate that the reduction in risk persists after completion of the 5-year treatment schedule. However, administration of tamoxifen resulted in some risks in both trials, particularly an increased risk of endometrial cancer.

In a study looking at raloxifene for preventing osteoporosis, researchers noticed that it also lowered the risk of breast cancer.[89] A study comparing the effectiveness of the two drugs, called the Study of Tamoxifen and Raloxifene (STAR) trial, found that raloxifene reduced the risk of invasive breast cancer to the same degree as tamoxifen, although it did not have the same protective effect against in situ cancer (DCIS or LCIS).[91] However, raloxifene did have lower risks of certain side effects such as uterine cancer and blood clots in the legs or lungs, compared to tamoxifen. Raloxifene has not yet been approved by the Food and Drug Administration (FDA) for chemoprevention.

A woman at increased risk of breast cancer should discuss taking tamoxifen or raloxifene with her doctor. It is estimated that more than 2 million US women could benefit from breast cancer chemoprevention.[95]

Prophylactic surgery

Women at very high risk of breast cancer may elect preventive (prophylactic) mastectomy. This operation removes one or both breasts before breast cancer has been discovered. Some women may also choose to have their breasts reconstructed after the surgery. One study reported a greater than 90% reduction in risk of breast cancer in high-risk women with family history who received prophylactic mastectomy.[96] Subsequent studies confirmed the benefit of prophylactic mastectomy in genetically susceptible women (i.e., women with BRCA1 and BRCA2 mutations).[97,98] While the operation reduces the risk of breast cancer, it does not guarantee that cancer will not develop in the small amount of breast tissue remaining after the operation. Prophylactic oophorectomy (surgical removal of the ovaries) also appears to reduce the risk of both breast and ovarian cancers in carriers of BRCA mutations.[99-101] A woman considering these operations should discuss this carefully with her doctor. A second opinion is strongly recommended.

What are the signs and symptoms of breast cancer?

Early-stage breast cancer typically produces no symptoms when the tumor is small and most treatable. It is therefore very important for women to follow recommended guidelines for finding breast cancer at an early stage, before symptoms develop. When breast cancer has grown to a size that can be felt, the most common physical sign is a painless mass.[41] Less common signs and symptoms include breast pain or heaviness and persistent changes to the breast, such as thickening, swelling, redness, and nipple abnormalities such as spontaneous discharge, erosion, inversion, or tenderness.[41] A woman should have any persistent abnormality evaluated by her physician.

How can breast cancer be detected early?

American Cancer Society guidelines for the early detection of breast cancer vary depending on a woman's age and include mammography and clinical breast examination (CBE) (Table 5, page 14), as well as magnetic resonance imaging (MRI) for women at high risk.

In 2007, an expert panel convened by the Society reported new recommendations for the use of MRI for women at increased risk for breast cancer.[102] The panel recommended annual screening using MRI in addition to mammography for women at high lifetime risk (20%-25% or greater) of the disease. Women at moderately increased risk (15%-20% lifetime risk) should talk with their doctors about the benefits and limitations of adding MRI screening to their yearly mammogram. Yearly MRI screening is not recommended for women whose lifetime risk of breast cancer is less than 15%.

Women at high risk include those who:

- Have a known BRCA1 or BRCA2 gene mutation
- Have a first-degree relative (mother, father, brother, sister, or child) with a BRCA1 or BRCA2 gene mutation, and have not had genetic testing themselves

- Have a lifetime risk of breast cancer of 20%-25% or greater, according to risk assessment tools that are based mainly on family history
- Had radiation therapy to the chest when they were between the ages of 10 and 30 years
- Have Li-Fraumeni syndrome, Cowden syndrome, or Bannayan-Riley-Ruvalcaba syndrome, or have a first-degree relative with one of these syndromes.

Women at moderately increased risk include those who:

- Have a lifetime risk of breast cancer of 15%-20%, according to risk assessment tools that are based mainly on family history
- Have a personal history of breast cancer, ductal carcinoma in situ (DCIS), lobular carcinoma in situ (LCIS), atypical ductal hyperplasia (ADH), or atypical lobular hyperplasia (ALH)
- Have extremely dense breasts or unevenly dense breasts when viewed by mammograms.

Although the American Cancer Society no longer recommends that all women perform monthly breast self-exams (BSE), women should be informed about the potential benefits and limitations associated with BSE. Research has shown that structured BSE is less important than self awareness. Women who detect their own breast cancer usually find it outside of a structured breast self-exam while bathing or getting dressed. A woman who wishes to perform periodic BSE should receive instruction from her health care provider and/or have her technique reviewed periodically.

Mammography

Numerous randomized trials and 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.[103-105] 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. Mammography is highly accurate, but like most medical tests, it is not perfect. On average, mammography will detect about 80%-90% of breast cancers in women without symptoms. Testing is somewhat more accurate in postmenopausal than in premenopausal women.[106] The small percentage of breast cancers that are not identified by mammography may be missed for any one of the following reasons: breast density, faster tumor growth rate, inadequate positioning of the breast, or simply failing 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 mammogram interpreted as abnormal or inconclusive until further tests are done. In most instances, additional tests (imaging studies and/or biopsy) lead to a final interpretation of normal breast tissue or benign (noncancerous) tissue.

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

Ages 40 and older

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

Ages 20-39

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

It is especially important that women receive regular mammograms. Recommended screening intervals are based on the duration of time a breast cancer is detectable by mammography before symptoms develop. Studies have shown that many breast cancers are diagnosed as larger, more advanced cancers simply because too much time has elapsed from the date of the last normal mammogram.[107,108] For this reason, women should talk with their doctors about a plan for receiving regular mammograms according to recommended guidelines.

There is no specific upper age at which mammography screening should be discontinued. Rather, the decision to stop regular mammography screening should be individualized based on the potential benefits and risks of screening in the context of overall health status and estimated longevity.[109] As long as a woman is in good health and would be a candidate for breast cancer treatment, she should continue to be screened with mammography.

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. Newer, digital mammograms may be even more accurate, especially for women with dense breasts. Many people are concerned about exposure to x-rays, but the level of radiation used in modern mammograms does not measurably increase the risk for breast cancer. The Mammography Quality Standards Act (MQSA), passed by Congress in 1992 and administered by the Food and Drug Administration, requires facilities to meet specific quality standards in order to offer mammography.

Medicare, Medicaid, and most private health insurance plans cover mammogram costs or a percentage of them. Low-cost mammograms are available in most communities. Contact the American Cancer Society at 1-800-ACS-2345 for information about facilities in your area.

Prevalence of mammography

According to data from the 2004 Behavioral Risk Factor Surveillance System (BRFSS), 58.3% of US women aged 40 and older have had a mammogram within the past year.[111] Table 6 (page 16) shows these results by state. Reported screening rates range from 47.7% in Idaho to 69.7% in Delaware.

The percentage of women aged 40 and older who report having had a mammogram within the past 2 years increased from 29% in 1987 to 70% in 2000 and remained stable through 2003, according to the National Health Interview Survey. However, recent data suggest a decline in mammography use. In 2005, the screening rate was 4% lower than in 2000.[9] Women who have less than a high school education, who have no health insurance coverage, or who are recent immigrants to the US are least likely to have had a recent mammogram (Table 7, page 17).

Mammography use by women below the poverty level has been increasing, yet low-income women are still less likely to have had a mammogram within the past 2 years than women at or above the poverty level (Table 8, page 18). The Centers for Disease Control and Prevention's National Breast and Cervical Cancer Early Detection Program (NBCCEDP) was begun in 1990 to improve access to breast cancer screening and diagnostic services for low-income women. Only 13% of eligible women received a screening mammogram through this program during 2002-2003.[112] Efforts to increase screening should specifically target recent immigrants and socioeconomically disadvantaged women, who are most likely to have the lowest rates of mammographic screening.[113] The American Cancer Society is committed to helping increase funding for the NBCCEDP in order to reach more eligible women.

Magnetic resonance imaging (MRI)

MRI uses magnetic fields instead of x-rays to produce very detailed, cross-sectional images of the body. The most useful MRI exams for breast imaging use a contrast material (gadolinium DTPA) that is injected into a small vein in the arm before or during the exam. This improves the ability of the MRI to capture detailed images of breast tissue.

For certain women at high risk for breast cancer based on the previously outlined criteria (page 13), screening MRI is recommended along with a yearly mammogram. While MRI is more sensitive in detecting cancers than mammograms, it also has a higher false-positive rate (findings that turn out not to be cancer), which results in more recalls and biopsies. Thus, MRI is not recommended for screening women at average risk of breast cancer, as it would result in unneeded biopsies and other tests in a large portion of these women.

Just as mammography uses x-ray machines designed especially to image the breasts, breast MRI also requires special equipment. Higher quality images are produced by dedicated breast MRI equipment than by machines designed for head, chest, or abdominal MRI scanning. However, many hospitals and imaging centers do not have dedicated breast MRI equipment available. It is important that screening MRIs be done at facilities that are capable of performing an MRI-guided breast biopsy at the time of the exam if abnormalities are found. Otherwise, the scan must be repeated at another facility at the time of the biopsy.

MRI is also more expensive than mammography. Most major insurance companies will likely pay for these screening tests if a woman is documented to be at high risk. At this time there are concerns about costs of and access to high-quality MRI breast screening services for women at high risk for breast cancer.

Clinical breast examination (CBE)

For average-risk, asymptomatic women in their 20s and 30s, it is recommended that a breast exam be a part of a regular health examination, preferably at least every 3 years. For women aged 40 and older, annual CBE can be an important complement to mammography, since a small percentage of cancers may be missed by mammography. Preferably, women should have their CBE shortly before their annual mammogram. For CBE, the woman undresses from the waist up. Using the pads of the fingers, the examiner gently feels the breasts, giving special attention to shape, texture, location of any lumps,

Table 6. Mammography and Clinical Breast Exam, Women 40 and Older, by State, US, 2004

	% Recent mammogram*					% Recent mammogram and clinical breast exam†				
	40+ years	40-64 years	65+ years	No usual source of medical care‡	No health insurance§	40+ years	40-64 years	65+ years	No usual source of medical care‡	No health insurance§
Alabama	60.3	58.6	64.1	36.4	34.2	52.7	53.7	50.4	29.9	27.4
Alaska	50.7	50.4	52.8	30.4	28.6	46.9	47.1	46.0	24.5	25.8
Arizona	56.7	52.4	65.4	27.3	35.9	48.9	46.8	53.3	19.9	30.2
Arkansas	51.0	50.6	51.9	27.3	29.0	44.4	44.8	43.4	21.4	25.4
California	57.8	55.0	64.5	34.4	34.9	46.8	46.4	47.8	22.2	31.2
Colorado	56.1	53.5	63.8	30.1	28.5	50.0	50.2	49.5	26.7	26.1
Connecticut	66.7	67.7	64.6	43.3	47.7	59.7	62.1	54.5	40.4	44.0
Delaware	69.7	68.8	71.8	33.4	46.4	63.9	64.9	61.8	28.1	40.3
Dist. of Columbia	63.0	62.6	63.9	39.9	41.3	56.3	58.3	51.9	30.6	36.0
Florida	60.5	56.0	68.3	28.9	27.7	53.6	52.0	56.3	25.7	23.2
Georgia	59.2	58.7	60.6	30.8	38.8	52.7	53.8	49.6	25.6	31.0
Hawaii	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
Idaho	47.7	45.4	53.1	22.3	21.7	43.0	42.6	44.1	18.4	20.2
Illinois	60.0	60.1	59.9	38.1	39.4	53.1	54.6	49.6	30.6	30.3
Indiana	52.8	52.4	53.6	25.6	30.0	45.2	47.1	40.9	21.4	28.1
Iowa	60.7	61.0	60.1	34.6	36.9	55.2	57.3	51.1	32.9	36.4
Kansas	63.1	62.3	64.7	33.1	30.5	57.1	58.2	54.7	29.7	28.3
Kentucky	59.8	61.4	56.0	36.7	32.3	52.6	55.1	46.3	31.4	29.7
Louisiana	60.0	59.5	61.5	38.4	39.2	51.8	52.8	48.9	33.2	33.5
Maine	64.1	63.8	64.8	32.6	40.9	58.8	59.2	57.8	26.4	34.1
Maryland	63.3	60.9	69.9	50.1	40.1	57.4	56.7	59.3	43.2	30.1
Massachusetts	68.4	69.5	66.3	33.3	51.8	61.4	64.4	55.2	29.7	47.4
Michigan	62.8	61.9	64.9	29.8	32.8	55.9	56.3	55.0	25.3	26.1
Minnesota	64.8	63.4	68.2	36.1	32.7	59.5	59.2	60.2	32.8	29.5
Mississippi	50.3	49.9	51.0	27.9	30.2	44.3	45.7	41.0	22.6	27.8
Missouri	52.3	50.3	56.5	21.3	21.2	45.4	45.9	44.2	16.2	15.9
Montana	56.4	53.0	64.2	28.4	32.7	50.1	48.5	53.7	23.5	29.3
Nebraska	62.2	62.3	62.0	39.1	41.8	55.5	58.1	50.2	34.8	35.8
Nevada	52.0	50.3	56.4	31.4	31.9	45.2	45.6	44.1	26.6	27.6
New Hampshire	64.8	63.7	67.4	28.5	33.7	58.5	60.0	54.8	23.8	30.9
New Jersey	60.2	60.3	60.0	31.4	35.7	53.2	55.5	48.3	27.7	32.7
New Mexico	53.0	51.8	56.2	25.1	25.3	46.0	46.2	45.6	21.9	22.4
New York	58.9	58.3	60.1	30.1	34.8	52.0	53.1	49.6	22.6	29.3
North Carolina	62.5	62.2	63.1	35.3	36.8	56.5	57.2	54.8	28.8	32.0
North Dakota	57.1	55.7	59.7	24.3	22.4	50.3	50.8	49.4	19.8	20.2
Ohio	58.5	55.3	65.3	28.5	33.7	51.3	49.8	54.8	25.8	31.1
Oklahoma	51.3	49.1	56.1	25.1	23.9	44.3	43.8	45.5	22.2	21.8
Oregon	57.3	55.9	60.4	22.8	25.4	49.0	49.8	47.2	18.8	22.9
Pennsylvania	55.5	56.0	54.5	23.3	34.8	47.7	50.2	42.9	17.6	23.5
Rhode Island	66.4	64.4	70.2	34.1	39.8	58.0	58.5	57.0	29.5	28.6
South Carolina	56.1	55.8	56.9	32.9	37.4	49.2	50.4	46.5	26.3	30.3
South Dakota	61.8	59.3	66.5	38.5	28.7	55.3	55.7	54.5	35.0	24.6
Tennessee	63.2	62.7	64.4	30.6	34.1	57.6	58.1	56.5	28.1	28.7
Texas	49.8	47.5	55.7	23.1	29.3	43.1	42.5	44.6	18.8	23.8
Utah	48.9	46.7	54.7	26.8	25.9	42.9	41.7	46.2	22.8	23.6
Vermont	59.2	59.6	58.4	26.9	40.2	51.8	53.6	47.3	22.6	34.0
Virginia	59.5	58.0	63.4	32.0	36.5	53.0	52.8	53.6	25.5	28.7
Washington	55.4	53.3	60.8	24.2	22.1	48.5	48.3	48.9	21.1	18.5
West Virginia	58.1	57.6	59.2	30.4	31.7	51.1	52.0	49.1	25.2	28.6
Wisconsin	59.4	55.9	66.7	34.4	42.1	54.4	53.4	56.7	29.1	40.3
Wyoming	51.6	48.8	58.8	27.5	25.9	45.3	45.5	44.9	22.8	22.0
United States#	58.3	56.8	61.7	30.7	32.9	51.1	51.4	50.3	24.7	28.0
Range	47.7-69.7	45.4-69.5	51.0-71.8	21.3-50.1	21.2-51.8	42.9-63.9	41.7-64.9	40.9-61.8	16.2-43.2	15.9-47.4

*A mammogram within the past year. †Both a mammogram and a clinical breast exam within the past year. ‡Women aged 40 and older who reported that they did not have a personal doctor or health care provider. §Women aged 40 to 64 who reported that they did not have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare. ¶Estimate not available as state did not participate in the 2004 survey. #Median for all reporting states.

Source: Behavioral Risk Factor Surveillance System Public Use Data File 2004, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 2005.

American Cancer Society, Surveillance Research, 2007

and whether such lumps are attached to the skin or to deeper tissue. The breasts should also be visually inspected for skin changes (e.g., dimpling, redness) and assymetry. The area under both arms will also be examined. CBE is also an opportunity for a woman and her health care provider to discuss changes in her breasts, early detection testing, and factors in the woman's history that might make her more likely to develop breast cancer. The duration of a properly conducted CBE is influenced by breast size and composition, but generally will take between 6 and 12 minutes.

Self-awareness

A woman who chooses to perform breast self-exams (BSE) should receive instructions and have her technique reviewed by a health care professional who performs clinical examinations. All women should become familiar with both the appearance and feel of their breasts to detect any changes and report them promptly to a doctor or nurse. If symptoms develop after a recent, normal mammogram, a woman should not assume that it is nothing to worry about; she should contact her doctor immediately. Lumps are not necessarily abnormal; for women who are still menstruating, they can appear and disappear with the menstrual cycle. Most lumps that are detected and tested are not cancerous.

The American Cancer Society believes the use of regular mammograms, MRI (in women at high risk), and clinical breast exams should be a part of every woman's preventive health care. Finding and reporting breast changes early offers women the best opportunity for reducing breast cancer deaths through early detection. The combined approach is clearly better than any single test. Breast physical exams without regular mammograms will miss many breast cancers that are too small for a woman or her doctor to feel but that can be seen on mammograms. Although a mammogram is a sensitive screening method, a small percentage of breast cancers do not show up on mammograms but can be felt by a woman or her physician.

Table 7. Mammography, Women 40 and Older, US, 2005

Characteristic	% Mammogram within the past year*	% Mammogram within the past two years*
Age		
40-49	47.8	63.5
50-64	55.5	71.8
65 and older	50.2	63.8
Race/ethnicity		
White (non-Hispanic)	52.9	68.1
African American (non-Hispanic)	49.9	64.9
Hispanic/Latina	41.7	59.6
American Indian/ Alaska Native†	46.9	66.6
Asian American‡	37.9	54.2
Education		
Less than high school	40.4	53.0
High school graduate	49.0	64.4
Some college or AA degree	53.6	69.1
College graduate (BA or BS)	60.2	76.8
Health insurance coverage		
Yes	54.1	69.8
No	24.1	33.2
Immigration§		
Born in US	52.2	67.2
In US less than 10 years	34.9	50.0
In US 10 or more years	46.0	63.3
Total	51.2	66.5

*Percentages are age-adjusted to the 2000 US standard population. †Estimates should be interpreted with caution because of small sample sizes. ‡Does not include Native Hawaiians and other Pacific Islanders. §Definition has changed such that individuals born in the US or in a US territory are reported separately from individuals born outside the US. Individuals born in a US territory have been in the US for any length of time.

Source: National Health Interview Survey Public Use Data File 2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

American Cancer Society, Surveillance Research, 2007

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.[114] 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 biologic therapy. Treatment guidelines from the National Comprehensive Cancer Network (NCCN) are available on its Web site (www.nccn.org/patients/patient_gls/_english/_breast/contents.asp).

Surgery

The primary goal of breast cancer surgery is to remove the cancer from the breast and to assess the stage of disease. In a lumpectomy, only cancerous tissue plus a rim of normal tissue is removed. Simple or total

Table 8. Mammography Use* by Age and Poverty Status,† Women, US, Selected Years 1987-2005

	40-49 years			50-64 years			65 years and older		
Year	Poor	Near poor	Non-poor	Poor	Near poor	Non-poor	Poor	Near poor	Non-poor
1987	18.6	18.4	36.8	14.6	24.2	37.0	13.1	19.9	29.7
1990	32.2	39.0	60.1	29.9	39.8	63.3	30.8	38.6	51.5
1991	33.0	43.8	61.2	37.3	50.2	66.0	35.2	41.8	57.8
1994	44.3	50.9	67.4	44.7	50.3	75.1	43.2	47.9	64.9
1998	44.8	46.9	68.4	52.7	61.8	78.7	51.9	57.8	70.1
1999	51.3	52.8	71.6	63.3	64.9	80.2	57.6	60.2	72.5
2000	47.4	43.6	69.9	61.7	68.3	82.6	54.8	60.3	75.0
2003	50.6	54.0	68.3	58.3	64.0	80.9	57.0	62.8	72.6
2005	42.5	49.8	69.0	50.4	58.9	76.8	52.3	56.2	70.1

*Percent of women having a mammogram within the past 2 years. †Poor persons are defined as below the poverty threshold. Near-poor persons have income of 100% to less than 200% of the poverty threshold. Non-poor persons have an income greater than 200% of the poverty level.

Note: 2005 data are preliminary and subject to adjustment based on official statistics released by NCHS.

Source: Data for 1987-2003 from *Health, United States, 2006*. Data for 2005 from National Health Interview Survey, Public Use Data File 2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

American Cancer Society, Surveillance Research, 2007

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 rarely used due to the proven effectiveness of less aggressive and disfiguring surgeries.[115]

If a woman chooses to have a mastectomy, she may want to consider having the breast rebuilt. This is called breast reconstruction and may be done with saline-filled or silicone-filled implants or tissue from other parts of the body. A woman considering this option should discuss this with her breast surgeon prior to her mastectomy surgery as it may influence the surgical site (inpatient versus outpatient) and type of procedure.

Lumpectomy is almost always followed by about 5 to 7 weeks of radiation therapy. A woman who chooses lumpectomy and radiation will have the same expected long-term survival as if she had chosen mastectomy.[116]

Both lumpectomy and mastectomy are often accompanied by removal of regional lymph nodes from the axilla, or armpit, 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 subsequent therapy and the course it should take. Unfortunately, surgery or radiation therapy involving the axillary nodes can lead to lymphedema, a serious swelling of the arm caused by retention of lymph fluid.[117] Newer options such as sentinel lymph node biopsy, in which selected 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.[118-120] If a woman is eligible for sentinel lymph node biopsy and elects this procedure, her breast cancer surgery should be performed at a facility with a medical care team experienced in the technique.

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.[121] There are two types of radiation therapy. External radiation is the usual type of radiation for women with breast cancer. Radiation is focused from a machine outside the body on the area affected by cancer. This usually includes the whole breast and, depending on the size and extent of the cancer, may include the chest wall and underarm area as well. Internal radiation therapy, known as brachytherapy, uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer. The mode of radiation therapy depends on the type and stage of the cancer being treated. Radiation therapy is typically given for 5 to 7 weeks. Radiation to the breast is almost always recommended after a lumpectomy, and in some circumstances, following mastectomy. Radiation of the chest wall may be recommended for a woman with 4 or more positive lymph nodes or a very large tumor, even though her breast has been removed.

The ability to target radiation therapy accurately has increased dramatically over past decades, which has greatly diminished side effects. A new technique called accelerated partial breast irradiation (APBI), which is currently being tested in clinical trials, is designed to give

radiation over a much shorter period of time (5 days total).[122] Women who are interested in this treatment are encouraged to talk to their doctor about participating in the national clinical trial of partial breast irradiation that began in 2005.

Systemic therapy

Systemic therapy includes biologic therapy, chemotherapy, and hormone therapy. Systemic treatment given to patients before surgery is called neoadjuvant therapy. It is often used to shrink the tumor enough to make surgical removal possible or to allow for less extensive surgery. This may allow women otherwise needing mastectectomy to undergo breast-conserving surgery. Neoadjuvant therapy has been found to be as effective as therapy given after surgery in terms of survival, disease progression, and distant recurrence.[123]

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

Approximately 15% to 30% of breast cancers overproduce the growth-promoting protein HER2/neu. These tumors tend to grow faster and are generally more likely to recur than tumors that do not overproduce HER2. Herceptin® (tratuzumab) is a monoclonal antibody which directly targets the HER2 protein of breast tumors and offers a real survival benefit for some women with metastatic breast cancer.[124-126] More recently, tratuzumab has been shown to be effective in early-stage breast cancer that overexpresses HER2. The combined results of two large trials indicate that adding tratuzumab to standard chemotherapy for early-stage HER2 positive breast cancer reduced the risk of recurrence and death by 52% and 33%, respectively, compared to chemotherapy alone.[127] In 2006, the FDA approved tratuzumab for all HER2 positive breast cancers. All invasive breast cancers should be tested for the HER2 protein in order to identify women who would benefit from this therapy. New guidelines were recently released aimed at improving the accuracy of HER2 testing.[128]

Chemotherapy

Adjuvant chemotherapy refers to the use of chemotherapy after the tumor has been removed for the purpose of increasing the cure rate of the patient. Research has established that combinations of drugs are more effective than just one drug alone for breast cancer treatment.[129] Chemotherapy is most effective when the full dose and cycle of drugs are completed in a timely manner. The benefit of chemotherapy is dependent upon multiple factors including the size of the cancer, the number of lymph nodes involved, the presence of estrogen or progesterone receptors, and the amount of HER2/neu protein made by the cancer cells. The most common drugs recommended to be used in combination in early breast cancer are cyclophosphamide, methotrexate, fluorouracil, doxorubicin (adriamycin), epirubicin, paclitaxel (Taxol), and docetaxel (Taxotere). Depending on the combination of drugs that is used, adjuvant chemotherapy is usually given for 3 to 6 months. These and other chemotherapy drugs may also be used to shrink cancer that has metastasized (spread to distant organs).

Hormone therapy

Estrogen, a hormone produced by the ovaries, promotes the growth of many breast cancers. Women whose breast cancers test positive for estrogen receptors can be given hormone therapy to block the effects of estrogen on the growth of breast cancer cells. Tamoxifen, the most common antiestrogen drug, is effective in both postmenopausal and premenopausal patients whose cancers are positive for hormone receptors. Recurrence and survival benefits generally increase with longer duration of tamoxifen use and have been shown to persist for at least 10 years following treatment.[130] The current recommendation is for 5 years of tamoxifen therapy, which has been shown to provide a 41% reduction in the annual recurrence rate and a 33% reduction in the breast cancer death rate.[130]

A class of drugs known as aromatase inhibitors (AIs) has been approved for use in treating both early and advanced breast cancer.[114] These drugs are letrozole, anastrozole, and exemestane. They work by blocking an enzyme responsible for producing small amounts of estrogen in postmenopausal women. Aromatase inhibitors are not an effective treatment in premenopausal women because they cannot stop the ovaries from producing estrogen. Clinical trials have been performed both comparing one of the AIs to tamoxifen for a total of 5 years and adding treatment with an AI following 2 to 6 years of tamoxifen.[131-136] In each of these studies, there has been a clear advantage to using either an AI instead of tamoxifen for a total of 5 years or switching to an AI after several years of tamoxifen, rather than keeping postmenopausal women on tamoxifen alone for 5 years. Clinical trials continue to assess which of these strategies is best. AIs have fewer side effects than tamoxifen because they do not cause endometrial cancer and very

rarely cause blood clots. They can, however, cause osteoporosis and bone fractures because they completely deplete postmenopausal women of estrogen. Many doctors prefer AIs over tamoxifen as the first hormonal treatment for postmenopausal women if the cancer is hormone receptor positive.

What research is currently being done on breast cancer?

Risk factors

Many studies are underway to help find the causes of breast cancer. One particular study, known as the Sister Study, will follow 50,000 women for at least 10 years to collect information about genes, lifestyle, and environmental factors that may cause breast cancer.[138] The American Cancer Society is helping to increase awareness and promote the recruitment of women for the study. To be eligible for the study, a woman must:

- Live in the US
- Be between the ages of 35 and 74
- Have a sister (related by blood) who has had breast cancer
- Not have had breast cancer herself

Women who want to find out more about the Sister Study can call 1-877-4-SISTER (1-877-474-7837) or visit the Sister Study Web site (www.sisterstudy.org).

The Breast and Prostate Cancer and Hormone-related Gene Variants Cohort Consortium (BPC3 Study), established in 2003, is a collaboration to pool data among 6 large-scale cohorts.[139] By combining data across studies, the investigators are examining the role of genes and gene-environment interactions in the development of cancer in a large and powerful dataset.

Prevention

Several approaches to the chemoprevention of breast cancer are under investigation. One approach involves aromatase inhibitors (AIs), which are currently used in the treatment of breast cancer. Aromatase inhibitors have proven more effective than tamoxifen in preventing recurrence in postmenopausal women with early-stage breast cancer and are associated with fewer side effects than tamoxifen.[140] Like tamoxifen, AIs are also expected to be effective in preventing estrogen-dependent breast cancers. Two international trials are currently examining the effectiveness of AIs for chemoprevention in high-risk postmenopausal women.[141]

New studies are also underway using other drugs (e.g., tyrosine kinase inhibitors and retinoids) that may be effective in preventing estrogen-receptor negative breast cancer.[142] There is inconsistent evidence suggesting the regular use of aspirin-like drugs may reduce a woman's risk of breast cancer.[143-146] The potential benefits of aspirin use are known to exceed the potential risks (bleeding and stomach ulceration) only in women at high risk of heart disease. Further studies are needed, particularly clinical trials, before aspirin can be recommended for breast cancer prevention.

Early detection

Research is underway to improve breast cancer detection through mammography, as well as to identify other radiologic approaches. Preliminary results from a large clinical trial of digital versus film mammograms reveal that women with dense breasts who are pre- or perimenopausal (i.e., women who had a last menstrual period within 12 months of their mammograms) or who are younger than age 50 may benefit from having a digital rather than a film mammogram.[147] Women with dense breast tissue have an increased risk of breast cancer. Recent research indicates that increased breast density over time may be a more accurate predictor of future breast cancer.[148] Future studies will focus on identifying the best time to measure breast density. Among women with newly diagnosed breast cancer, MRI may be useful in detecting cancer in the contralateral (opposite) breast.[149] Diagnosing the second breast cancer earlier could help women make treatment decisions and might spare them from extra rounds of surgery and chemotherapy later.

Treatment

Improved understanding of breast tumor cell biology and molecular genetics is enabling researchers to design cancer therapies that are tailored to the unique characteristics of each patient and tumor. Such "rational therapeutics" may have greater efficacy and fewer side effects than conventional chemotherapy.[150] Clinical trials of targeted therapies such as tyrosine kinase inhibitors have demonstrated benefits in patients with advanced disease and may also delay or reverse hormone resistance. The tyrosine kinase inhibitor Lapatinib®, may be effective in delaying disease progression in women with HER2-positive advanced breast cancer who have become resistant to tratuzumab.[151] Metronomic therapy, a relatively new concept in anti-angiogenic therapy (drugs that block blood supply to the tumor), uses much lower and less toxic doses of chemo-

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 the American Cancer Society Clinical Trials Matching Service at http://clinicaltrials.cancer.org or call the Society's National Cancer Information Center (1-800-ACS-2345) to identify clinical trial options. This free and confidential service can help people locate a cancer clinical trial based on their situation and personal preferences. 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 physician or by contacting the NCI Cancer Information Service at 1-800-4-CANCER, or visiting the NCI Clinical Trials Web site at http://www.cancer.gov/clinicaltrials.[137] Patients should consult their personal doctors and cancer specialists for detailed information about appropriate treatment options.

therapy agents than currently used in combination with an antiangiogenesis drug.[152] A recent study in experimental animals suggests that bisphosphonates, which are currently used to treat bone metastases in advanced breast cancer patients, may also be able to prevent bone metastases in women with early breast cancer.[153]

A recent combined analysis of data from three clinical trials found that advances in chemotherapy have substantially improved survival for patients with lymph node-positive, ER-negative tumors.[154] Advances in chemotherapy have had less of an impact for women with ER-positive tumors, although those who receive adjuvant hormonal therapy still have better disease-free and overall survival than ER-negative patients. Research is underway to identify which women with ER-positive disease truly benefit from the addition of chemotherapy to hormonal therapy.[155] This research includes a new clinical trial that will use information on the expression of 21 genes in breast tumor tissue (using a tool called Oncotype DX) to assign women to treatment groups based on their predicted likelihood of recurrence.

According to the results of a new study, an aggressive, difficult-to-treat form of breast cancer appears to be more common in young African-American and Hispanic women.[156] The class of disease is called "triple negative" breast cancer, which means the tumors lack receptors for the hormones estrogen and progesterone and for the protein HER2. Researchers are working to find targeted drugs to treat women with this form of breast cancer.

Quality of life

Fatigue is one of the most common long-term side effects of breast cancer treatment. Results of a longitudinal study of disease-free breast cancer survivors indicate that fatigue may persist for up to 10 years in one-third of women treated for breast cancer.[157] Women with cardiovascular problems and depressive symptoms, or who were treated with combined radiation and chemotherapy, were more likely to experience fatigue. Exercise programs that incorporate aerobic activity and resistance training appear to alleviate some of the side effects associated with breast cancer and its treatment, including fatigue, depression, and anxiety.[158]

There is mounting research describing the impact that caring for loved ones with cancer can have on the caregiver. Researchers have begun to test interventions to help individuals, and often families, deal with the physical, psychological, and financial effects of providing care.[159]

What resources are available in your community?

The American Cancer Society offers a wide range of resource programs for breast cancer patients and their families:

Reach to Recovery®

Breast cancer survivors provide one-on-one support and information to help others cope with breast cancer. Specially trained survivors serve as volunteers, responding by phone or in person 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 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 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 side 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 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.

Cancer Survivors Network℠

Created by and for cancer survivors, the Cancer Survivors Network (CSN) is a unique, Web-based support service designed not only for survivors, but for anyone dealing personally with cancer. Read discussions and stories, find and connect with others like yourself, and much more.

American Cancer Society Web Site and National Cancer Information Center

For comprehensive cancer information and for more information about the programs listed above, call the American Cancer Society toll-free at 1-800-ACS-2345 (available 24 hours a day) or visit the American Cancer Society Web site at www.cancer.org.

Other sources of patient information and support include:

Encore Plus Program of the YWCA, Office of Women's Health Initiatives

A program that targets medically underserved women in need of early detection education, breast and cervical cancer screening, and support services. It provides women in treatment and recovering from breast cancer

Goals for a National Breast Cancer Research Agenda

In 1998, the Breast Cancer Progress Review Group, a collaboration of prominent members of the scientific, medical, advocacy, and industry communities organized by the National Cancer Institute, released its recommendations for a national breast cancer research agenda.[160] The report included research goals in biology, etiology, genetics, prevention, detection and diagnosis, treatment, control, and outcomes. These goals include:

- Expanding knowledge of normal breast development and the earliest breast lesions
- Identifying modifiable risk factors and investigating the interaction between genes and environment
- Identifying genetic mutations that occur at each stage of breast cancer development and progression and evaluating these changes as targets for intervention
- Identifying surrogate endpoint biomarkers to serve as early indicators of intervention effectiveness
- Developing better breast imaging and other technologies for diagnosis of clinically significant disease and better prediction of clinical outcomes
- Encouraging development of innovative treatments in academic settings and testing their effectiveness through better-supported, more representative clinical trials
- Gaining fuller understanding of mechanisms underlying behavioral change and identifying how psychosocial factors influence disease response and survival
- Better understanding the effects of multimodal treatments and improving methods to study patient-focused outcomes across the continuum of age and race/ethnicity

with a unique combined peer group support and exercise program. Call 1-888-953-9922 to find a program in your area.

National Breast and Cervical Cancer Early Detection Program (NBCCEDP)
Telephone: 1-800-CDC-INFO or 1-800-232-4363
http://www.cdc.gov/cancer/nbccedp/

A Centers for Disease Control and Prevention (CDC) program that helps low-income women gain access to timely, high-quality screening programs for the detection of breast and cervical cancer.

National Breast Cancer Coalition
Telephone: 1-800-622-2838
www.natlbcc.org

A grassroots advocacy movement dedicated to the eradication of breast cancer through research, access, and influence.

National Cancer Institute (NCI) Cancer Information Service
Telephone: 1-800-4-CANCER or 1-800-422-6237
www.cancer.gov

A nationwide telephone service for cancer patients and their families and friends, the public, and health care professionals that answers questions and sends booklets about cancer.

Sisters Network
Telephone: 1-866-781-1808
www.sistersnetworkinc.org

A national African American breast cancer survivors' support group committed to increasing local and national attention on the devastating impact that breast cancer has on the African American community.

Susan G. Komen for the Cure
Telephone: 1-800-IM-AWARE or 1-800-462-9273
www.komen.org

A national volunteer organization working to eradicate breast cancer by advancing research, education, screening, and treatment. The helpline is answered by trained volunteers who provide information to callers with breast health or breast cancer concerns.

Y-ME National Breast Cancer Hotline
Telephone: 1-800-221-2141 (English),
1-800-986-9505 (Spanish)
www.y-me.org

A hotline that provides counseling, educational programs, and self-help meetings for breast cancer patients, their families, and friends.

US Department of Health and Human Services
Breast Cancer Information (Web site only)
www.hhs.gov/breastcancer/index.html

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. Since 1972, the Society has awarded approximately $323 million in breast cancer research grants. As of July 1, 2007, the American Cancer Society, through its extramural research grants program, funds 197 extramural research projects relating to breast cancer that total almost $106 million.

Specific examples of ongoing breast cancer research being conducted by Society grantees include:

- Researching the feasibility of a breast cancer vaccine given in conjunction with standard breast cancer therapy. The regimes being tested attempt to bolster the body's inherent immune response to produce a therapy with lower toxicities than conventional treatment.
- Examining the links between mood and the body's hormonal response to stress, as well as the ability of the immune system to fight the disease in women with breast cancer recurrence. A recent publication from this study reported that distress reduction from a psychological intervention contributed to improved health.
- Studying the effectiveness of a state-implemented Breast and Cervical Cancer Prevention and Treatment Act, which provides the opportunity for low-income women to be treated at the early stages of the disease and hence improve their outcome. This research will evaluate the program's ability to reach more underserved breast cancer patients and evaluate whether early treatment services impact their lives and health outcomes.

The Society also internally conducts epidemiologic studies of breast cancer and performs surveillance research to monitor long-term trends and statistics. Using information collected from more than 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 (DES), estrogen replacement therapy (ERT), family history of cancer, obesity, smoking,

and spontaneous abortion on the risk of death from breast cancer. The Society is currently enrolling 500,000 ethnically and geographically diverse cancer-free adults in the Cancer Prevention Study-3 (CPS-3). These men and women will be followed for 20 to 30 years to gain a better understanding of the lifestyle, behavioral, environmental, and genetic factors that cause or prevent 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 the local and national levels. In addition, the Society's 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 and their caregivers, the use of complementary therapies, and the needs of minority women with breast cancer.

Collaborative relationships and partnerships are established to achieve goals greater than could be achieved individually. The American Cancer Society devotes significant resources to educating the public and health care professionals. An educational partnership with the National Hispanic Medical Association, the League of United Latin American Citizens (LULAC), and Conrad & Associates will result in the production of a short film and guidebook that will include information on breast cancer early detection and treatment options specifically targeting Hispanic underserved women. Since 1995, the American Cancer Society has joined with the Longaberger Company in the Horizon of Hope® campaign that provides information to millions of women attending home shows about the importance of breast cancer early detection and the resources available through the American Cancer Society. Funds generated through this relationship support breast cancer research and education projects, including improving access to high-quality mammography screening and meeting the psychosocial needs of women with breast cancer.

The American Cancer Society and its sister organization, the American Cancer Society Cancer Action Network℠ (ACS CAN), are involved in advocacy efforts at both the federal and state level that will increase access to quality breast cancer screening, treatment, and care for all women; increase government funding for breast cancer research; and provide a voice for the concerns of breast cancer patients and survivors. Listed below are some of the efforts that the American Cancer Society and ACS CAN have been involved with in the past few years:

- Expanding the National Breast and Cervical Cancer Early Detection Program (NBCCEDP)

The American Cancer Society and ACS CAN continue to successfully lobby for millions of dollars at the state and federal levels to support this program that provides low-income, uninsured, and underinsured women access to breast and cervical cancer screening tests and follow-up services.

- Protection of the Breast and Cervical Cancer Prevention and Treatment Act

This act ensures that low-income women diagnosed with cancer through the NBCCEDP are eligible for Medicaid coverage for their treatment. ACS CAN continues to advocate at the state level to protect Medicaid dollars so there is sufficient funding for treatment of these women.

- Funding the Patient Navigator Program

ACS CAN continues the fight to fund the Patient Navigator Program, which Congress passed with bipartisan support to place trained "navigators" in health facilities to help medically underserved populations get the quality care they need. Navigators improve mammography compliance rates and follow up and decrease the average length of time between initial breast exams and biopsies to a rate comparable to patients in private care.

- Eliminating Medicare co-pays for breast cancer screening services

Legislation is proposed to eliminate Medicare co-pays for mammography and colorectal screenings. This will help remove the financial barrier to these critical services, allowing more beneficiaries to receive lifesaving screenings.

- Funding for cancer research

The American Cancer Society and ACS CAN continue to work to increase government funding for cancer research at the National Institutes of Health (NIH), including the National Cancer Institute (NCI) and the National Center on Minority Health and Health Disparities (NCMHD).

Sources of Statistics

General information. The statistics and statements in this booklet, unless otherwise stated, refer to invasive (not in situ) breast cancer.

New cancer cases. The method for estimating new cancer cases in the current year has been refined several times over the years to take advantage of improvements in data and statistical methods. Beginning with 2007, the American Cancer Society is using a new projection method. The new method is based on incidence data from 1995-2003 from 41 states that met the North American Association of Central Cancer Registries' (NAACCR) high-quality data standard for incidence, covering about 86% of the US population. This contrasts with the previous method, which was based on incidence data from the 9 oldest SEER registries, covering about 10% of the US population. Furthermore, the new method considers geographic variations in socio-demographic and lifestyle factors, medical settings, and cancer screening behaviors as predictors of incidence. Additionally, this method accounts for expected delays in case reporting. For the reasons listed above, the estimates from the new method are likely to be more accurate than those from the old method. For more information about the new method, see Pickle L, Hao Y, Jemal A, et al. *CA Cancer J Clin.* 2007;57:30-42.[161]

The expected number of new breast cancer cases in 2007 is lower than in the previous report. This is likely due to lower incidence rates of breast cancer in the areas covered by the new method (41 states) compared to areas covered in the old method (9 SEER registries), as well as the recent decline in breast cancer incidence. However, we discourage the use of our estimates to track year-to-year changes in breast cancer occurrence because these estimates are model-based and may vary considerably from year to year. Actual incidence rates are generally more informative statistics to use when tracking cancer incidence trends, even though they are not available for the current year.

Incidence rates. Incidence rates are defined as the number of people per 100,000 who develop disease during a given time period. When referenced as such, US SEER incidence rates were previously made available on SEER's Web site (http://seer.cancer.gov) and within the *SEER Cancer Statistics Review 1975-2004.*[3] When not referenced otherwise, US SEER incidence rates are based on American Cancer Society analysis of the SEER Public Use Dataset, 1973-2004, November 2006 submission, using *SEER*Stat 6.3.5*, a statistical software package from the National Cancer Institute.[162] Note that because of delays in reporting newly diagnosed cancer cases to the cancer registries, cancer incidence rates for the most recent diagnosis years may be underestimated. Incidence rates adjusted for delay in reporting are used when available and are referenced as such. State incidence rates were previously published by NAACCR in *Cancer in North America, 2000-2004.*[4] These rates were calculated using data on cancer cases collected by the SEER program and the National Program of Cancer Registries, and population data collected by the US Bureau of the Census. Except for the age-specific incidence rates described in Figure 1 (page 2), all incidence rates in this publication are age-adjusted to the 2000 US standard population.

Cancer deaths. The estimated number of US breast cancer deaths in 2007 is calculated by fitting the numbers of cancer deaths from 1969 through 2004 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.[163]

Mortality rates. Similar to incidence rates, mortality rates are defined as the number of people per 100,000 who die from a disease during a given time period. Death rates used in this publication were previously made available by SEER on its Web site (http://seer.cancer.gov) and within the *SEER Cancer Statistics Review 1975-2004.*[3] 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.

Annual percent change in incidence rates. When not referenced otherwise, annual percentage changes in the incidence rate were estimated based on American Cancer Society analysis of the SEER Public Use Dataset, 1973-2004, November 2006 submission, using SEER*Stat 6.3.5.[162,164]

Survival rates. Five-year survival statistics are based on cancer patients diagnosed between 1996-2003, 10-year survival rates are based on diagnoses between 1993-

2003, and 15-year survival rates are based on diagnoses between 1987-2003. All patients were followed through 2004. Relative survival rates are used to adjust for normal life expectancy (and events such as death from heart disease, accidents, and diseases of old age). Relative survival is calculated by dividing the percentage of observed 5-year survival for cancer patients by the 5-year survival expected for people in the general population who are similar to the patient group with respect to age, sex, race, and calendar year of observation. When referenced as such, 5-year survival statistics were originally published in *SEER Cancer Statistics Review, 1975-2004*.[3]

Probability of developing cancer. Probabilities of developing breast cancer were calculated using DevCan (Probability of Developing Cancer Software) developed by the National Cancer Institute.[165] These probabilities reflect the average experience of women in the US and do not take into account individual behaviors and risk factors (e.g., use 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).[111] The BRFSS is an ongoing system of surveys conducted by the state health departments in cooperation with the Centers for Disease Control and Prevention. The prevalence of mammography by race/ethnicity is from the National Health Interview Survey.[166]

Factors that influence cancer rates

Age adjustment to the year 2000 standard

Epidemiologists use a statistical method called "age adjustment" to compare groups of people with different age compositions. This is especially important when examining cancer rates since cancer is generally a disease of older people. For example, without adjusting for age, it would be inaccurate to compare the cancer rates of Florida, which has a large elderly population, to that of Alaska, which has a younger population. Without adjusting for age, it would appear that the cancer rates in Florida are much higher than Alaska. However, once the adjustment is made for age, it appears their rates are similar.

Since the publication of *Breast Cancer Facts & Figures 2003-2004*, we used the most recent US census (2000) as the basis for calculating age-adjusted rates. Formerly, our statistics were age-adjusted to the 1970 census. This change follows federal agencies that publish statistics. The change will also require a recalculation of age-adjusted rates for previous years to allow valid comparison 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. On average, Americans are living longer because of the decline in infectious and cardiovascular diseases. Greater longevity allows more people to reach the age when cancer and other chronic diseases become more common. Using the Year 2000 Standard in age adjustment instead of the 1970 or 1940 standards allows age-adjusted rates to be closer to the actual, unadjusted rate in the population. Breast cancer incidence rates standardized to the 2000 standard are about 20% higher than rates age-adjusted to the 1970 standard.

It is important to note that in no case will the actual number of cases/deaths or age-specific rates change, only the age-standardized rates that are weighted to the different age distribution.

Change in population estimates. Cancer rates are also affected by changes in population estimates, which are the basis for calculating rates for new cancer cases and deaths. The Census Bureau updates and revises population estimates every year. The Bureau calculates "intercensal" estimates after a new census is completed – for example, using information from both the 1990 and 2000 censuses, the Bureau obtains better estimates for the 1990s. These revisions are based on the most recent census information and on the best available demographic data reflecting components of population change (e.g., births, deaths, net internal migration, and net international immigration). Thus, it is customary to recalculate cancer rates based on the revised population estimates. In less populated areas, such as rural counties, or in adjacent urban and suburban areas where there is substantial migration of residents from a more populous urban area to a less populous suburban area between censuses, a change in population estimates can affect the county rate by as much as 20%. This is in contrast to large counties, where a small change in a large population estimate will not affect rates nearly as much. More information about the influence of change in population count on US cancer rates is available on the NCI Web site (www.cancer.gov/newscenter/pressreleases/Census2000).

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