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Annual Report to the Nation on the Status of Cancer, 1973-1999, Featuring Implications of Age and Aging on U.S. Cancer Burden

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COMMUNICATION

Annual Report to the Nation on the Status of Cancer, 1973-1999, Featuring Implications of Age and Aging on U.S. Cancer Burden

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BACKGROUND. The American Cancer Society, the National Cancer Institute, the North American Association of Central Cancer Registries (NAACCR), the National Institute on Aging (NIA), and the Centers for Disease Control and Prevention, including the National Center for Health Statistics (NCHS) and the National Center for Chronic Disease Prevention and Health Promotion, collaborated to provide an annual update on cancer occurrence and trends in the United States. This year's report contained a special feature focusing on implications of age and aging on the U.S. cancer burden.
METHODS. For 1995 through 1999, age-specific rates and age-adjusted rates were calculated for the major cancers using incidence data from the Surveillance, Epidemiology, and End Results Program, the National Program of Cancer Registries, and the NAACCR, and mortality data from NCHS. Joinpoint analysis, a model of joined line segments, was used to examine 1973-1999 trends in incidence and death rates by age for the four most common cancers. Deaths were classified using the eighth, ninth, and tenth revisions of the International Classification of Diseases. Age-adjusted incidence and death rates were standardized to the year 2000 population, which places more emphasis on older persons, in whom cancer rates are higher.
RESULTS. Across all ages, overall cancer death rates decreased in men and women from 1993 through 1999, while cancer incidence rates stabilized from 1995 through

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1999. Age-specific trends varied by site, sex, and race. For example, breast cancer incidence rates increased in women aged 50-64 years, whereas breast cancer death rates decreased in each age group. However, a major determinant of the future cancer burden is the demographic phenomenon of the aging and increasing size of the U.S. population. The total number of cancer cases can be expected to double by 2050 if current incidence rates remain stable.

CONCLUSIONS. Despite the continuing decrease in cancer death rates and stabilization of cancer incidence rates, the overall growth and aging of the U.S. population can be expected to increase the burden of cancer in our nation. ***Cancer* 2002; 94:2766–92.** *© 2002 American Cancer Society.*

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The American Cancer Society (ACS), the National Cancer Institute (NCI), the North American Association of Central Cancer Registries (NAACCR), and the Centers for Disease Control and Prevention (CDC), including the National Center for Health Statistics (NCHS), and the National Center for Chronic Disease Prevention and Health Promotion, collaborate to produce an annual report on the current burden of cancer in the United States. Four years ago, the initial report documented the first sustained decline in cancer death rates, a notable reversal in the increases observed since national record keeping was instituted in the 1930s.[1] The second and third reports updated and confirmed these declines in both cancer incidence and death rates.[2,3] These reports highlighted lung cancer and the tobacco epidemic[2] and opportunities to improve the prevention, early detection, and treatment of colorectal cancer.[3] The fourth report examined trends from 1973 through 1998 in the incidence and death rates for the four most common cancers (breast, prostate, lung, and colon/rectum), which make up more than half the cancer burden.[4] The fourth report also featured specific cancers for which incidence or death rates increased in one or more population groups during 1992 through 1998.

The current report focuses on cancer rates and trends in the context of an aging population. As more of the U.S. population reaches older ages, there are extensive implications for an increased cancer burden among older Americans now and in future decades. The increase in the number of older persons results from reduced death rates in all age groups, which yields a greater probability of surviving to an older age and increased life expectancy (both at birth and at older ages), and the aging of the 75 million persons born between 1946 and 1964 (the baby boom era).[5–9] The current report examines the impact of age on current cancer rates and trends and projects the future cancer burden due to the anticipated growth and aging of the population through 2050. This report is also the first in this series to use a revision to the coding system for cause of death (International Classification of Diseases [ICD], revision 10), implemented for 1999 deaths, and a change in age-adjustment of cancer rates to the federally adopted year 2000 population standard. Also, the National Institute on Aging (NIA) was invited to participate.

SUBJECTS AND METHODS

Additional data and information on cancer incidence, mortality, and survival are available from the following Internet addresses: www.seer.cancer.gov (NCI); www.naaccr.org/CINAPlus/index.html (NAACCR); www.cdc.gov/cancer/NPCR (CDC); www.cdc.gov/nchs/about/major/dvs/mortdata.html (NCHS); and www.cancer.org (ACS). More detailed information, figures, and methodology pertaining to this report are available at the NCI Internet address.

Cancer Cases and Deaths

Information on newly diagnosed cancer cases in the United States is based on data collected by registries in the NCI's Surveillance, Epidemiology, and End Results (SEER) Program[10] and the CDC's National Program of Cancer Registries (NPCR).[11] Data from registries in both programs are evaluated and published annually by NAACCR.[12]

Cancer deaths in the United States are reported to state vital statistics offices and consolidated into a database by NCHS through the National Vital Statistics System (NVSS).[13] That system codes cause of death according to the version of the ICD in use in the United States at the time.[14–16] A conversion algorithm aids comparability between versions of ICD codes, which are categorized according to SEER site groups.[10]

For the long-term trend analyses, SEER incidence (original areas covering 10% of the U.S. population) and U.S. death data from NCHS for 1973 through 1999

were used. For the age-specific analyses of current cancer occurrence, the SEER and NPCR incidence data reported by NAACCR were used; these data are from 28 registries that meet NAACCR criteria for highest quality data for 1995 through 1999.[12] Approximately 55% of the U.S. population is included in the NAACCR combined cancer incidence rates. For various racial and ethnic populations, estimates of recent (1995-1999) rates and the proportion of cases and deaths contributed by each cancer were based on incidence data from SEER (1992 expansion areas covering 14% of the U.S. population) and U.S. mortality data. All information on primary site and histology for incidence was converted to the International Classification of Diseases for Oncology, second edition (ICDO-2),[17] and categorized according to SEER site groups.[10]

Methodologic Changes

Two methodologic changes were made for the current report that affect the comparability of data with that of previous years. One is the change in the coding and classification of causes of death reported on death certificates and the other, more influential, is the change to a contemporary population age distribution used in age standardization for both incidence and death rates.

Changes in coding of mortality data effective with 1999 deaths

Effective with deaths in 1999, in the United States causes of death were coded and classified according to the tenth revision of the World Health Organization's ICD (ICD-10),[16] rather than the ninth revision (ICD-9)[15] used from 1979-1998. Among the many changes in ICD-10 were increases in classification detail, the shift to an alphanumeric classification system, and a number of changes in the coding rules by which a single cause of death is selected from among the multiple causes reported by physicians as causing or contributing to the death. The change from ICD-9 to ICD-10 caused discontinuities in trends for many causes of death, including cancer. The nature and extent of these discontinuities are described in a recent report.[18] The extent of these discontinuities is measured by comparability studies in which death records are double coded by the two revisions and results compared. Overall, approximately 0.7% more deaths are assigned to cancer under ICD-10. For certain cancers, however, discontinuities are greater or lesser, in part due to the allowed use of categories for persons who died with more than one cancer or died from metastatic disease.

Changes in population standard effective with 1999 cases and deaths

Also affecting reporting incidence and mortality data for 1999, the standard population used to age-adjust cancer incidence and death rates was changed to the year 2000 U.S. standard million population. All age-adjusted rates and age-specific rates covering more than a five year age group presented in the current report used the new year 2000 population standard. The change to the year 2000, which recently was adopted uniformly by federal health agencies, has consequences for the levels of cancer rates, and, in some cases, for comparisons over time and among groups.[19] Earlier reports on death rates from the NCHS were based on the 1940 standard population,[20] whereas most earlier reports on cancer incidence and death rates were based on a 1970 standard population.[21] Thus, age-adjusted rates and trends in the current report cannot be compared with previously published reports. Further, rates adjusted to the 2000 standard produce cancer incidence and death rates 20% to 50% higher than rates published to the 1970 standard. More detailed information on the effect of age-adjustment can be found on the following Internet addresses: www.cdc.gov/nchs/data/ IW134Pfct.pdf (NCHS); and www.naaccr.org/Training/html/2000pop/2000pop.html (NAACCR).

Cancer Incidence and Death Rates

The U.S. Census Bureau provided annual county resident population estimates that were used in the computation of incidence and death rates. Population data for Hawaii were adjusted slightly for an undercount of Asian/Pacific Islanders.

All rates were expressed per 100,000 population and age-adjusted by the direct method to the new year 2000 standard. For the current report, all calculated rates had at least 25 cases or deaths in the population of interest. The term "all sites" refers to all invasive cancer sites combined (excluding basal and squamous cell carcinoma of the skin, and including in situ bladder carcinoma), as well as other sites not shown in the tables or figures.

This year's report features information by age-specific groups ($<$ 20 years old, 20 to 49 years, $<$ 50 years, 50 to 64 years, 65 to 74 years, and 75 years and older) based on SEER incidence and survival rates, NAACCR reported incidence rates, or the U.S. death rates in either sex among the total, white, or black population. The interval of 1995 through 1999 was chosen for cancer-specific incidence and death rates to represent the broadest cross-section of the current burden and to improve the precision of rates esti-

mated and data interpretability for all populations in the analyses (Hispanic, black, American Indian/Alaska Native [AI/AN], Asian/Pacific Islander [API], and white). Hispanic ethnicity is not a mutually exclusive group from the four race categories. The interval 1973 through 1999 was used for analysis of long-term trends as it was the longest period for which comparable SEER incidence data were available. Availability and accuracy of information on race and ethnicity limit estimation of long-term trends for some populations.

Projections of future cancer cases for 2000 through 2050 were calculated using 1999 age-specific NAACCR reported incidence rates applied to national population projections reported by the U.S. Census Bureau.[6,7] These projections assume that cancer incidence rates do not change during the 50-year period.

Survival and Cancer Prevalence

Survival is estimated from SEER data (persons diagnosed in 1990-1998 and followed through 1999) using standard methods of following persons with cancer until they die or were known to be alive at a point in time. Standard life table procedures were used to calculate observed survival rates, the proportion of cancer patients surviving for a specified time after diagnosis.[22] Relative survival is defined as the ratio of observed survival to expected survival in a comparable group of cancer-free individuals. This estimate predicts the effect of the cancer alone on the patient cohort while ignoring deaths not associated with the cancer.[22]

Cancer prevalence is the number of cancer survivors currently alive. For the current report, prevalence was estimated from SEER incidence and followup data from 1978 through 1997. The numbers were projected to the U.S. population on January 1, 1998, and represent estimated complete prevalence.[10] While SEER does not represent a random sample of the U.S. population, it is more representative than a single registry. Moreover, the use of multiple SEER registries from around the country allows calculation of prevalence statistics; prevalence statistics can be calculated for different groups characterized by race/ethnicity, age at diagnosis, and length of survivorship.[23]

Statistical Analyses

Long-term trends are conveniently described by joinpoint analysis (JPA), a statistical model of joined lines (straight lines on a log scale). This analysis chooses a model of line segments such that each are joined at points called a "joinpoint." Each joinpoint denotes a statistically significant change in trend.[24] For JPA, the overall significance level was set to $P = 0.05$, and allowed for a maximum of three joinpoints and four line segments allowed. An annual percent change (APC) was used to describe the trend for each line segment with statistical significance assessed using a two-sided $P = 0.05$.

RESULTS

Relationship of Age to Cancer Incidence and Mortality

Cancer incidence and death rates increased with age (Fig. 1). Rates for 1995–1999 were generally higher for men than for women, except for persons below the age of 50, where women had higher cancer incidence and death rates. Cancer rates for persons aged 50-64 years were 7- to 16-fold higher than rates for younger persons, and rates for persons aged 65-74 years were 2- to 3-fold higher than rates for persons aged 50-64 years. The incidence and death rates for persons aged 75 years and older were higher still, with death rates two-fold higher than rates for persons aged 65-74 years.

The decrease in age-adjusted death rates from 1990 through 1999 did not offset the increase in the population size or the absolute number of cancer deaths (Fig. 2). During the period 1990 through 1999, the U.S. age-adjusted death rates (top panel) decreased by almost 6%. The decrease was larger for persons younger than age 65 years than in persons aged 65 years and older (data not shown). The U.S. population (second panel) increased by almost 10% (24 million), with a slightly larger percentage increase of persons aged 65 years and older. As a consequence of the aging population, the total number of cancer deaths (third panel) during the 1990s increased about 9% (44,500 deaths), due to the increase in the number of cancer deaths among persons aged 65 years and older.

Long-Term Trends in Incidence by Age, Sex, and Race (White, Black)

While the JPA describes long-term trends, the focus for the presentation of results is on the most recent line segment from the analysis; thus, the years covered will vary for different cancers. During the period 1995 through 1999, the overall cancer incidence rate was stable; however, for certain site, age, sex, and race groups, rates increased, decreased, or remained stable (Table 1). For example, males had stable overall cancer incidence rates and females had increasing rates.

For men under 50 years, cancer incidence rates decreased, while such rates were stable for men aged 50 years and older. Even among men less than 50 years of age, not all incidence rates decreased: prostate cancer increased, while lung and colorectal cancer de-

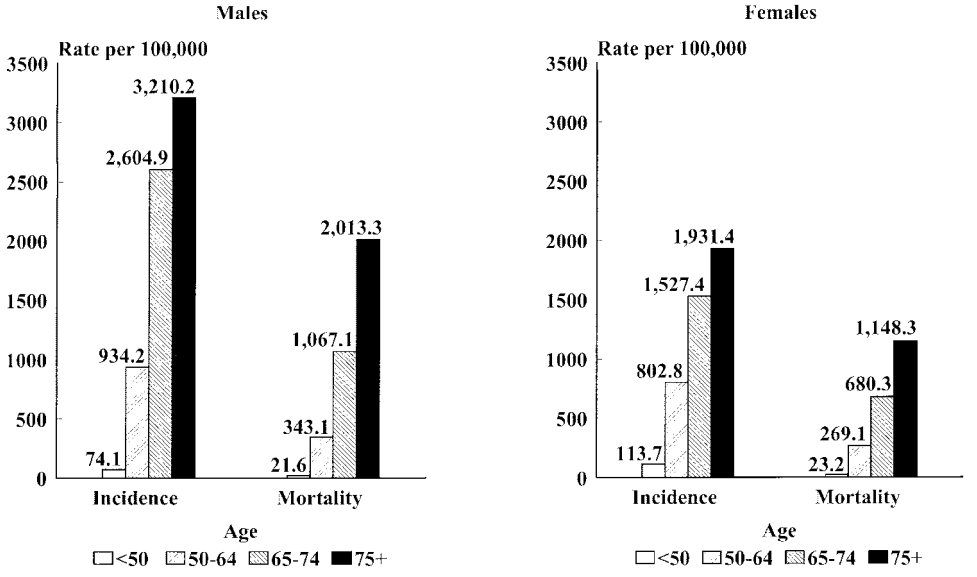

FIGURE 1. Average annual cancer incidence and death rates for all cancers combined by gender and age, 1995-1999. Incidence: Surveillance, Epidemiology and End Results Program and the National Program of Cancer Registries areas reported by the North American Association of Central Cancer Registries as meeting high data quality standards. The areas cover approximately 55% of the U.S. population: California (Los Angeles and Greater Bay area), Colorado, Connecticut, Delaware, Georgia (Atlanta area), Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Michigan (Detroit area), Minnesota, Nebraska, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, Rhode Island, Utah, Washington (Seattle area), West Virginia, Wisconsin, and Wyoming. Death data are from the National Vital Statistics System of the National Center for Health Statistics; the data cover the entire U.S. population. Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.

creased. Similarly, for men aged 50 years and older, the stable rate overall masked decreases in lung cancer for each of the older age groups, a decrease in colorectal cancer in men aged 50-64 and 65-74 years, and an increase in prostate cancer for men aged 50-64 years. Overall, cancer incidence rates declined in black men during 1992-1999 and stabilized in white men for the 1995-1999 time period. Rates decreased in both black and white men under age 50 and in black men aged 65-74 years.

For women, overall cancer incidence rates increased from 1987 to 1999, due to increased rates among women aged 50-64 and 65-74 years. In particular, breast cancer rates increased for black and white women aged 50-64 years, and lung cancer rates increased for women 65-74 years. The trends also varied by cancer type. Incidence rates decreased for lung cancer but increased for colorectal cancer among women under age 50 years, while colorectal cancer incidence rates decreased for women aged 75 years and older. Race differences were evident among women in the same age groups. Colorectal cancer incidence rates increased for white women under 50 years but not for black women, and decreased for white women aged 50-64 years but increased for black women in this age group.

Long-Term Trends in Cancer Death Rates by Age, Sex, and Race (White, Black)

The U.S. death rate from all cancers combined decreased an average of more than 1% per year from 1993 to 1999 (Table 2). Total cancer mortality decreased during the most recent time interval in black and white men for each age group and in women for each age group except those aged 75 years and older. For women aged 75 years and older, rates were stable for white women and increased for black women. The continuing decline in death rates involved all of the four most common cancer sites. Lung cancer mortality decreased during the 1990s in men for each age group and in women under age 65 years. Prostate cancer death rates decreased for each age group in black men and in white men, except for white men aged less than 50 years. Breast cancer mortality decreased for each age group in white women and in black women less than 65 years of age, with increases for black women aged 75 years and older. While most age groups and cancers have shown declines, reductions for women were limited to ages younger than 75 years for all sites combined, and to ages below 65 years for death due to lung cancer.

The decline in cancer death rates during the 1990s reflects longer term mortality trends in which

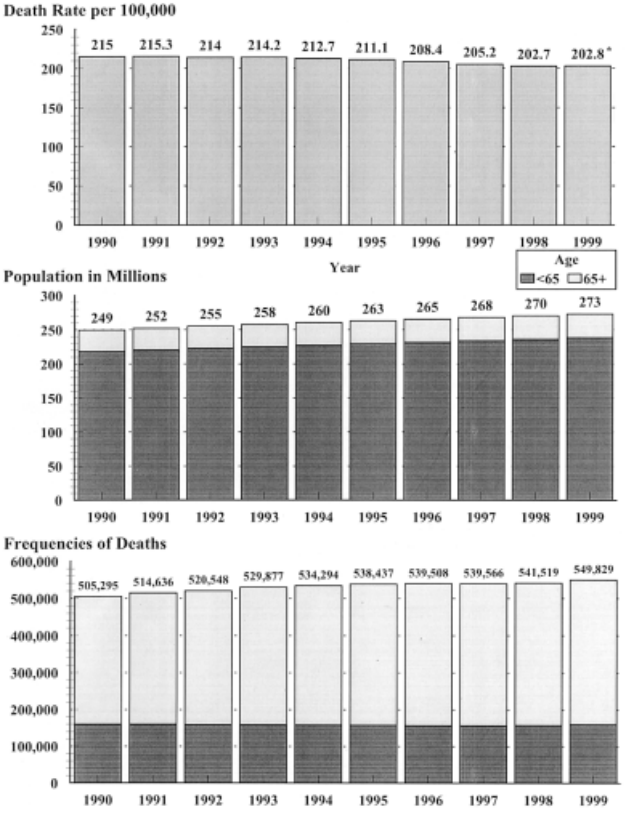

FIGURE 2. Trends in cancer death rates, frequencies and trends in population, United States, 1990-1999. Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population. Death data are from the National Vital Statistics System of the National Center for Health Statistics; the data cover the entire U.S. population. While the rate is 202.8 for 1999 based on the International Classification of Diseases (ICD), revision 10, definitions, the rate would have been lower, approximately 201.4, if the cancer definitions and rules from ICD revision 9 were used based on a comparability study.

the downturn in rates began earlier and was larger proportionately at younger than at older ages (Table 2). By the mid-1970s, the death rate from all cancers combined was decreasing by about 4% per year for persons < 20 years of age and about 2% per year for persons aged 20-49 years, although the rate of increase was less than 1% per year in persons aged 50 and older. By the 1990s, age- and race-specific cancer death rates had stopped increasing and had begun to decrease among white and black persons of all ages, except women aged 75 years and older. Despite differences in the magnitude and timing of the long-term trends in mortality across the four most common cancer sites, the death rates decreased during the 1990s in most age and race subgroups, with the exception of older women, particularly lung cancer deaths.

Top 10 Cancer Incidence Sites by Age and Sex, 1995-1999

The 10 most frequently occurring cancers within each of five age groups were ranked by the frequency of cases for both sexes combined (Table 3). The most frequent cancers among persons younger than 20 years of age were different from those occurring in older age groups, with leukemia and cancers of the brain and other nervous system accounting for more than 40% of their cancers. The difference in cancer incidence rates among young men and women was small.

Among persons aged 20-49 years, breast cancer incidence was substantially higher than any other cancer, representing about one-fourth of all cancers diagnosed in this age group. Melanoma, colorectal cancer, and lung cancer ranked high in frequency for this age group, with incidence rates for these three cancers in men and women being similar, in contrast to sex-specific rates reported for older aged groups. In addition, non-Hodgkin lymphoma, oral cavity/pharynx, and testis cancer were common in men, while cancer of the cervix, ovary, and thyroid were common in women. In contrast to other age groups, age-adjusted cancer incidence rates for all sites combined among persons aged 20-49 years were much higher for women than for men.

Beginning with the 50-64 year-old age category, breast, prostate, lung, and colorectal cancers emerged as the most frequently occurring cancers, an observation that persisted for all older age groups, although the rank order changed among the three oldest age groups. Breast cancer occurred most frequently among persons aged 50-64 years, with nearly all cases occurring in women, while prostate cancer ranked first among persons aged 65-74 years, and colorectal cancer was first among persons aged 75 years and older. Lung cancer ranked second among persons aged 65-74 years and 75 years and older. The magnitude of the rates for lung and colorectal cancers varied substantially by sex in the older age categories.

Although the median age for the incidence of all cancers combined was 68 years, the range of the median age at diagnosis varied widely for specific cancers (Fig. 3). For the four most common cancers (breast, prostate, lung, and colorectal), the percentage of persons aged 65 years and older ranged from nearly 50% to more than 70%. Gallbladder cancer had the highest median age at 73 years, with 76% of the cancers occurring in persons aged 65 years and older, and 40% or more of cancers of the gallbladder, colon/rectum, pancreas, stomach, urinary bladder, and pleura were diagnosed in persons aged 75 years and older. On the

TABLE 1
Cancer Incidence Trends by Joinpoint Analyses[a] for 1973 through 1999 for the Most Common Cancers by Race, Sex, and Age, SEER,[b] 1973–1999

			Incidence							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
All sites	All races, both sexes	All ages	1973–83	0.9[d]	1983–92	1.8[d]	1992–95	−1.9	1995–99	0.2
		< 20	1973–91	1.0[d]	1991–99	−0.2				
		20–49	1973–80	−0.6[d]	1980–90	1.5[d]	1990–99	−0.7[d]		
		< 50	1973–80	−0.5[d]	1980–90	1.5[d]	1990–99	−0.7[d]		
		50–64	1973–99	0.9[d]						
		65–74	1973–89	1.7[d]	1989–92	4.8[d]	1992–95	−3.3[d]	1995–99	0.2
		75+	1973–92	1.5[d]	1992–95	−3.3	1995–99	0.2		
	All races, males	All ages	1973–89	1.4[d]	1989–92	5.0[d]	1992–95	−4.9[d]	1995–99	−0.3
		< 20	1973–97	0.8[d]	1997–99	−4.7				
		20–49	1973–82	0.5[d]	1982–87	3.5[d]	1987–92	1.2[d]	1992–99	−2.4[d]
		< 50	1973–82	0.4[d]	1982–86	3.8[d]	1986–92	1.3[d]	1992–99	−2.2[d]
		50–64	1973–85	1.3[d]	1985–89	0.2	1989–92	4.6[d]	1992–99	−0.1
		65–74	1973–89	1.6[d]	1989–92	8.2[d]	1992–95	−5.5[d]	1995–99	−0.2
		75+	1973–89	1.3[d]	1989–92	4.0	1992–95	−7.8[d]	1995–99	−0.1
	All races, females	All ages	1973–80	0.2	1980–87	1.6[d]	1987–99	0.3[d]		
		< 20	1973–99	0.7[d]						
		20–49	1973–80	−1.2[d]	1980–86	1.2[d]	1986–99	0.2		
		< 50	1973–80	−1.1[d]	1980–86	1.2[d]	1986–99	0.2		
		50–64	1973–75	3.5	1975–78	−2.2	1978–99	0.7[d]		
		65–74	1973–78	0.6	1978–87	2.4[d]	1987–99	0.3[d]		
		75+	1973–89	1.5[d]	1989–99	0.1				
	White, both sexes	All ages	1973–83	1.0[d]	1983–92	1.9[d]	1992–95	−2.1	1995–99	0.2
		< 20	1973–99	0.7[d]						
		20–49	1973–80	−0.5	1980–89	1.9[d]	1989–99	−0.7[d]		
		< 50	1973–80	−0.4	1980–89	1.9[d]	1989–99	−0.7[d]		
		50–64	1973–82	0.4	1982–92	1.3[d]	1992–99	0.5		
		65–74	1973–89	1.8[d]	1989–92	4.8[d]	1992–95	−3.5[d]	1995–99	0.3
		75+	1973–92	1.5[d]	1992–95	−3.5	1995–99	0.2		
	White, males	All ages	1973–89	1.4[d]	1989–92	4.9[d]	1992–95	−5.3[d]	1995–99	−0.2
		< 20	1973–99	0.6[d]						
		20–49	1973–83	0.7[d]	1983–86	5.8[d]	1986–92	1.1[d]	1992–99	−2.7[d]
		< 50	1973–82	0.6[d]	1982–86	4.2[d]	1986–91	1.7[d]	1991–99	−2.3[d]
		50–64	1973–89	1.1[d]	1989–92	3.9[d]	1992–99	−0.1		
		65–74	1973–88	1.5[d]	1988–92	6.6[d]	1992–95	−5.6[d]	1995–99	−0.2
		75+	1973–89	1.4[d]	1989–92	3.7	1992–95	−8.0[d]	1995–99	−0.2
	White, females	All ages	1973–80	0.3	1980–87	1.7[d]	1987–99	0.3[d]		
		< 20	1973–99	0.8[d]						
		20–49	1973–80	−0.9[d]	1980–90	1.1[d]	1990–93	−1.4	1993–99	0.7[d]
		< 50	1973–80	−0.8[d]	1980–87	1.2[d]	1987–99	0.1		
		50–64	1973–75	3.7	1975–78	−2.3	1978–99	0.7[d]		
		65–74	1973–78	0.8	1978–87	2.5[d]	1987–99	0.3[d]		
		75+	1973–89	1.6[d]	1989–99	0.1				
	Black, both sexes	All ages	1973–84	1.5[d]	1984–89	0.5	1989–92	4.4[d]	1992–99	−1.4[d]
		< 20	1973–99	0.6[d]						
		20–49	1973–82	−0.9	1982–94	1.1[d]	1994–99	−2.1[d]		
		< 50	1973–82	−0.8	1982–94	1.1[d]	1994–99	−2.1[d]		
		50–64	1973–83	2.3[d]	1983–90	−0.1	1990–93	4.5	1993–99	−0.5
		65–74	1973–89	1.8[d]	1989–92	6.2	1992–99	−2.4[d]		
		75+	1973–92	1.4[d]	1992–99	−1.3[d]				
	Black, males	All ages	1973–81	2.6[d]	1981–89	0.6	1989–92	6.7[d]	1992–99	−2.7[d]
		< 20	1973–99	1.0[d]						
		20–49	1973–85	0.3	1985–95	1.9[d]	1995–99	−5.1[d]		
		< 50	1973–86	0.1	1986–89	4.8	1989–95	0.7	1995–99	−4.1[d]
		50–64	1973–82	3.2[d]	1982–89	−1.0	1989–93	6.4[d]	1993–99	−1.0

(*continued*)

TABLE 1
(*continued*)

			Incidence							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
		65–74	1973–89	1.8[d]	1989–92	9.5	1992–99	−4.1[d]		
		75+	1973–89	1.6[d]	1989–92	5.4	1992–95	−7.9	1995–99	−0.6
	Black, females	All ages	1973–91	1.1[d]	1991–99	0.1				
		< 20	1973–99	0.3						
		20–49	1973–99	−0.1						
		< 50	1973–99	−0.1						
		50–64	1973–86	1.7[d]	1986–99	0.3				
		65–74	1973–90	2.1[d]	1990–99	0.0				
		75+	1973–99	1.0[d]						
Lung and bronchus	All races, both sexes	All ages	1973–81	3.0[d]	1981–91	1.1[d]	1991–99	−0.9[d]		
		< 50	1973–77	3.5	1977–99	−2.8[d]				
		50–64	1973–79	3.4[d]	1979–88	0.9[d]	1988–99	−2.5[d]		
		65–74	1973–81	3.8[d]	1981–92	1.5[d]	1992–99	−0.6[d]		
		75+	1973–91	3.0[d]	1991–99	0.9[d]				
	All races, males	All ages	1973–80	2.2[d]	1980–91	−0.2	1991–99	−2.2[d]		
		< 50	1973–77	0.7	1977–88	−2.7[d]	1988–99	−4.1[d]		
		50–64	1973–78	2.4[d]	1978–87	0.1	1987–99	−3.2[d]		
		65–74	1973–81	2.1[d]	1981–92	−0.1	1992–99	−1.9[d]		
		75+	1973–76	6.6[d]	1976–91	1.1[d]	1991–99	−1.3[d]		
	All races, females	All ages	1973–81	6.3[d]	1981–91	3.4[d]	1991–99	0.5		
		< 50	1973–76	10.2[d]	1976–99	−2.0[d]				
		50–64	1973–81	6.2[d]	1981–90	2.2[d]	1990–99	−1.7[d]		
		65–74	1973–82	8.8[d]	1982–91	4.5[d]	1991–99	1.2[d]		
		75+	1973–89	7.0[d]	1989–97	4.2[d]	1997–99	−0.8		
	White, both sexes	All ages	1973–81	3.0[d]	1981–91	1.2[d]	1991–99	−0.9[d]		
		< 50	1973–78	2.3	1978–99	−3.1[d]				
		50–64	1973–78	3.7[d]	1978–88	1.1[d]	1988–99	−2.4[d]		
		65–74	1973–81	3.8[d]	1981–92	1.6[d]	1992–99	−0.5		
		75+	1973–91	3.2[d]	1991–99	0.8[d]				
	White, males	All ages	1973–80	2.1[d]	1980–91	−0.2	1991–99	−2.3[d]		
		< 50	1973–85	−2.0[d]	1985–99	−4.3[d]				
		50–64	1973–78	2.1[d]	1978–88	−0.2	1988–99	−3.5[d]		
		65–74	1973–81	1.8[d]	1981–92	−0.1	1992–99	−1.9[d]		
		75+	1973–77	5.4[d]	1977–91	1.1[d]	1991–99	−1.6[d]		
	White, females	All ages	1973–76	10.4[d]	1976–88	4.8[d]	1988–99	1.2[d]		
		< 50	1973–78	5.3[d]	1978–99	−2.3[d]				
		50–64	1973–82	6.0[d]	1982–91	1.7[d]	1991–99	−1.8[d]		
		65–74	1973–81	9.4[d]	1981–88	5.7[d]	1988–99	2.1[d]		
		75+	1973–89	7.5[d]	1989–97	4.3[d]	1997–99	−1.1		
	Black, both sexes	All ages	1973–84	3.2[d]	1984–99	−0.5[d]				
		< 50	1973–99	−2.2[d]						
		50–64	1973–84	3.8[d]	1984–99	−2.2[d]				
		65–74	1973–92	2.6[d]	1992–99	−2.7[d]				
		75+	1973–99	2.5[d]						
	Black, males	All ages	1973–84	2.9[d]	1984–99	−1.6[d]				
		< 50	1973–99	−2.6[d]						
		50–64	1973–84	2.9[d]	1984–99	−2.9[d]				
		65–74	1973–85	3.2[d]	1985–99	−1.7[d]				
		75+	1973–99	1.3[d]						
	Black, females	All ages	1973–90	4.4[d]	1990–99	0.2				
		< 50	1973–99	−1.4[d]						
		50–64	1973–85	6.9[d]	1985–99	−0.9				
		65–74	1973–91	7.3[d]	1991–99	−0.4				
		75+	1973–99	5.1[d]						

(*continued*)

TABLE 1
(*continued*)

			Incidence							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
Colon and rectum	All races, both sexes	All ages	1973–85	0.9[d]	1985–95	−1.8[d]	1995–99	0.3		
		< 50	1973–94	−1.0[d]	1994–99	2.6[d]				
		50–64	1973–85	0.7[d]	1985–99	−1.3[d]				
		65–74	1973–85	0.7[d]	1985–96	−1.7[d]	1996–99	0.6		
		75+	1973–80	2.2[d]	1980–88	−0.1	1988–95	−2.5[d]	1995–99	0.2
	All races, males	All ages	1973–86	1.1[d]	1986–95	−2.1[d]	1995–99	−0.1		
		< 50	1973–99	−0.3[d]						
		50–64	1973–85	1.2[d]	1985–99	−1.1[d]				
		65–74	1973–86	0.9[d]	1986–99	−1.7[d]				
		75+	1973–79	2.5[d]	1979–88	0.5	1988–95	−3.2[d]	1995–99	0.1
	All races, females	All ages	1973–84	0.6[d]	1984–95	−1.7[d]	1995–99	0.7		
		< 50	1973–96	−1.4[d]	1996–99	9.2[d]				
		50–64	1973–81	0.6	1981–99	−1.3[d]				
		65–74	1973–85	0.3	1985–93	−2.0[d]	1993–99	0.2		
		75+	1973–81	2.4[d]	1981–99	−1.2[d]				
	White, both sexes	All ages	1973–85	0.9[d]	1985–95	−1.9[d]	1995–99	0.3		
		< 50	1973–95	−1.3[d]	1995–99	4.5[d]				
		50–64	1973–85	0.6[d]	1985–99	−1.5[d]				
		65–74	1973–85	0.6[d]	1985–96	−1.7[d]	1996–99	0.6		
		75+	1973–84	1.5[d]	1984–99	−1.6[d]				
	White, males	All ages	1973–86	1.1[d]	1986–95	−2.3[d]	1995–99	0.0		
		< 50	1973–99	−0.5[d]						
		50–64	1973–85	1.1[d]	1985–99	−1.3[d]				
		65–74	1973–85	1.0[d]	1985–99	−1.7[d]				
		75+	1973–87	1.3[d]	1987–95	−3.2[d]	1995–99	0.1		
	White, females	All ages	1973–84	0.7[d]	1984–94	−2.0[d]	1994–99	0.2		
		< 50	1973–95	−1.9[d]	1995–99	6.6[d]				
		50–64	1973–81	0.7	1981–99	−1.6[d]				
		65–74	1973–85	0.4	1985–88	−3.9	1988–99	−0.7[d]		
		75+	1973–83	1.7[d]	1983–99	−1.5[d]				
	Black, both sexes	All ages	1973–80	3.6[d]	1980–99	−0.3				
		< 50	1973–99	0.1						
		50–64	1973–78	5.3[d]	1978–99	0.4				
		65–74	1973–89	1.8[d]	1989–99	−1.8[d]				
		75+	1973–78	6.8[d]	1978–99	−0.6[d]				
	Black, males	All ages	1973–80	4.9[d]	1980–99	−0.3				
		< 50	1973–97	0.9[d]	1997–99	−16.0				
		50–64	1973–99	1.0[d]						
		65–74	1973–92	1.7[d]	1992–99	−4.1[d]				
		75+	1973–77	14.8	1977–99	−0.6				
	Black, females	All ages	1973–80	2.7[d]	1980–99	−0.3				
		< 50	1973–99	−0.2						
		50–64	1973–99	0.6[d]						
		65–74	1973–83	3.1[d]	1983–99	−0.6				
		75+	1973–99	−0.2						
Female breast	All races	All ages	1973–80	−0.6	1980–87	3.7[d]	1987–99	0.5[d]		
		< 50	1973–80	−1.5	1980–86	2.9[d]	1986–99	−0.3		
		50–64	1973–80	−1.2	1980–85	4.1[d]	1985–99	1.6[d]		
		65–74	1973–78	−1.2	1978–87	4.6[d]	1987–99	0.4		
		75+	1973–82	0.8	1982–87	5.2[d]	1987–99	0.0		
	White	All ages	1973–80	−0.5	1980–87	3.8[d]	1987–99	0.4		
		< 50	1973–80	−1.4[d]	1980–86	2.9[d]	1986–99	−0.4		
		50–64	1973–80	−1.1	1980–85	4.4[d]	1985–99	1.5[d]		
		65–74	1973–78	−1.0	1978–87	4.7[d]	1987–99	0.3		
		75+	1973–82	0.8	1982–87	5.4[d]	1987–99	0.0		

(*continued*)

TABLE 1
(*continued*)

			Incidence							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
	Black	All ages	1973–79	−0.7	1979–86	3.9[d]	1986–99	0.9[d]		
		< 50	1973–91	1.4[d]	1991–99	−1.1				
		50–64	1973–99	2.1[d]						
		65–74	1973–99	2.2[d]						
		75+	1973–99	1.7[d]						
Prostate	All races	All ages	1973–88	2.7[d]	1988–92	16.2[d]	1992–95	−11.7[d]	1995–99	1.4
		< 50	1973–90	3.0[d]	1990–93	33.6[d]	1993–99	10.9[d]		
		50–64	1973–85	2.9[d]	1985–89	7.3[d]	1989–92	26.4[d]	1992–99	2.3[d]
		65–74	1973–88	3.7[d]	1988–92	20.1[d]	1992–95	−11.2[d]	1995–99	0.6
		75+	1973–88	2.0[d]	1988–92	11.3[d]	1992–95	−18.7[d]	1995–99	−0.1
	White	All ages	1973–88	2.8[d]	1988–92	16.1[d]	1992–95	−12.8[d]	1995–99	1.6
		< 50	1973–89	3.5[d]	1989–93	24.5[d]	1993–99	9.7[d]		
		50–64	1973–88	3.7[d]	1988–92	23.5[d]	1992–99	2.0[d]		
		65–74	1973–88	4.0[d]	1988–92	20.0[d]	1992–95	−12.3[d]	1995–99	0.9
		75+	1973–88	2.1[d]	1988–92	11.0[d]	1992–95	−19.6[d]	1995–99	−0.1
	Black	All ages	1973–89	2.1[d]	1989–92	20.6[d]	1992–96	−5.7[d]	1996–99	0.1
		< 50	[e]	[e]						
		50–64	1973–89	2.2[d]	1989–93	26.2[d]	1993–99	1.4		
		65–74	1973–89	2.4[d]	1989–92	24.7[d]	1992–99	−5.0[d]		
		75+	1973–89	1.9[d]	1989–92	14.3[d]	1992–95	−16.3[d]	1995–99	−1.0

[a] Joinpoint analysis of trends allowed for up to three joinpoints based on rates per 100,000 that were age-adjusted to the 2000 U.S. standard population.

[b] From SEER registries covering 10% of the U.S. population: metropolitan areas of San Francisco, Detroit, Atlanta, and Seattle-Puget Sound; and states of Connecticut, Hawaii, Iowa, Utah, and New Mexico.

[c] The APC is the Annual Percent Change based on rates age-adjusted to the 2000 U.S. standard population using the joinpoint regression program.

[d] The APC is statistically significantly different from zero (two-sided $P < .05$).

[e] Joinpoint results are not shown if less than 10 cases in any year.

SEER: Surveillance, Epidemiology and End Results program.

other hand, testicular cancer had the lowest median age at 34 years, with slightly more than 90% of the cancers diagnosed before age 50. Also, 70% of persons with non-Hodgkin lymphoma and more than half of the persons with cancers of the bones and joints, cervix, thyroid, and Hodgkin lymphoma were under the age of 50 years.

Top 10 Cancer Mortality Sites by Age and Sex, 1995-1999

Lung cancer was the leading cause of cancer deaths, accounting for almost one-third of deaths in men and about one-fourth of deaths in women (Table 4). Colorectal cancer was the second leading cause of cancer death overall, accounting for about 10% of deaths, with breast and prostate cancer deaths together representing another 14%. The percentage distribution and rank order varies when calculated only for men or for women. These four cancers account for more than half of all cancer deaths. Six other cancers (pancreas, non-Hodgkin lymphoma, leukemia, ovary, stomach, brain and other nervous system) account for almost one-fourth of cancer deaths, with many other types contributing to the remaining 27%.

More than 30% of cancer deaths among persons less than 20 years of age were due to leukemia, and one-fourth were due to brain and other nervous system cancers. A number of other types of cancers account for the remaining cancer deaths in young persons.

Cancer death rates among persons aged 20 to 49 years were more than 10-fold higher than rates in children and teenagers, with cancer of the lung and bronchus emerging as a leading cause of death, particularly among men, and breast cancer causing 30% of the cancer deaths in women. Colorectal cancer, brain and other nervous system cancers, as well as non-Hodgkin lymphoma and leukemia, accounted for one-fourth of cancer deaths in this age group. Overall cancer death rates were slightly higher in women than in men.

Lung cancer was responsible for about one-third of all deaths for persons aged 50-64 years and 65-74 years. Colorectal cancer accounted for about 8-10% of

TABLE 2
Cancer Death Trends by Joinpoint Analyses[a] for the Most Common Cancers by Race, Sex, and Age, United States,[b] 1973–1999

			Mortality							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
All sites	All races, both sexes	All ages	1973–85	0.5[d]	1985–93	0.2[d]	1993–99	−1.1[d]		
		< 20	1973–78	−4.2[d]	1978–82	−1.0	1982–85	−4.9	1985–99	−2.2[d]
		20–49	1973–76	−2.1[d]	1976–91	−1.2[d]	1991–99	−1.9[d]		
		< 50	1973–76	−2.2[d]	1976–91	−1.3[d]	1991–99	−1.9[d]		
		50–64	1973–85	0.3[d]	1985–91	−0.4[d]	1991–99	−1.9[d]		
		65–74	1973–86	0.9[d]	1986–93	0.3[d]	1993–99	−1.0[d]		
		75+	1973–93	0.9[d]	1993–99	−0.3[d]				
	All races, males	All ages	1973–80	0.9[d]	1980–92	0.3[d]	1992–99	−1.5[d]		
		< 20	1973–99	−2.8[d]						
		20–49	1973–91	−1.3[d]	1991–99	−1.8[d]				
		< 50	1973–92	−1.4[d]	1992–99	−1.9[d]				
		50–64	1973–78	0.6[d]	1978–90	−0.1	1990–99	−2.1[d]		
		65–74	1973–80	0.9[d]	1980–90	0.3[d]	1990–94	−0.6[d]	1994–99	−1.4[d]
		75+	1973–79	1.6[d]	1979–92	0.9[d]	1992–99	−1.2[d]		
	All races, females	All ages	1973–92	0.5[d]	1992–99	−0.6[d]				
		< 20	1973–76	−5.5[d]	1976–99	−2.3[d]				
		20–49	1973–79	−1.9[d]	1979–91	−1.0[d]	1991–99	−2.1[d]		
		< 50	1973–79	−2.0[d]	1979–91	−1.1[d]	1991–99	−2.1[d]		
		50–64	1973–87	0.3[d]	1987–95	−0.9[d]	1995–99	−2.3[d]		
		65–74	1973–75	−0.3	1975–86	1.5[d]	1986–94	0.7[d]	1994–99	−0.8[d]
		75+	1973–87	0.9[d]	1987–93	1.4[d]	1993–99	0.3		
	White, both sexes	All ages	1973–92	0.4[d]	1992–99	−0.9[d]				
		< 20	1973–99	−2.8[d]						
		20–49	1973–79	−1.7[d]	1979–91	−1.2[d]	1991–99	−2.0[d]		
		< 50	1973–78	−1.9[d]	1978–91	−1.3[d]	1991–99	−2.0[d]		
		50–64	1973–88	0.2[d]	1988–94	−1.2[d]	1994–99	−2.2[d]		
		65–74	1973–86	0.9[d]	1986–94	0.2[d]	1994–99	−1.0[d]		
		75+	1973–93	0.9[d]	1993–99	−0.2				
	White, males	All ages	1973–80	0.8[d]	1980–92	0.2[d]	1992–99	−1.4[d]		
		< 20	1973–99	−2.9[d]						
		20–49	1973–99	−1.4[d]						
		< 50	1973–99	−1.5[d]						
		50–64	1973–88	0.1[d]	1988–94	−1.4[d]	1994–99	−2.4[d]		
		65–74	1973–79	0.9[d]	1979–90	0.2[d]	1990–94	−0.5	1994–99	−1.2[d]
		75+	1973–79	1.5[d]	1979–92	0.8[d]	1992–99	−1.1[d]		
	White, females	All ages	1973–93	0.5[d]	1993–99	−0.8[d]				
		< 20	1973–99	−2.6[d]						
		20–49	1973–79	−1.9[d]	1979–90	−1.0[d]	1990–99	−2.1[d]		
		< 50	1973–79	−2.0[d]	1979–90	−1.0[d]	1990–99	−2.1[d]		
		50–64	1973–87	0.3[d]	1987–95	−0.9[d]	1995–99	−2.4[d]		
		65–74	1973–75	0.1	1975–86	1.5[d]	1986–94	0.6[d]	1994–99	−0.7[d]
		75+	1973–87	0.8[d]	1987–93	1.4[d]	1993–99	0.3		
	Black, both sexes	All ages	1973–84	1.3[d]	1984–92	0.6[d]	1992–99	−1.2[d]		
		< 20	1973–99	−2.2[d]						
		20–49	1973–92	−1.0[d]	1992–99	−2.5[d]				
		< 50	1973–92	−1.0[d]	1992–99	−2.5[d]				
		50–64	1973–84	0.8[d]	1984–90	−0.4	1990–99	−1.9[d]		
		65–74	1973–75	−0.6	1975–89	1.5[d]	1989–95	−0.1	1995–99	−2.6[d]
		75+	1973–80	2.8[d]	1980–91	1.8[d]	1991–99	0.1		
	Black, males	All ages	1973–82	1.9[d]	1982–90	1.0[d]	1990–93	−0.5	1993–99	−2.1[d]
		< 20	1973–99	−2.4[d]						
		20–49	1973–79	0.2	1979–91	−1.2[d]	1991–99	−3.0[d]		
		< 50	1973–79	0.0	1979–91	−1.3[d]	1991–99	−3.0[d]		
		50–64	1973–84	1.0[d]	1984–87	−1.5	1987–90	0.5	1990–99	−2.3[d]
		65–74	1973–83	2.0[d]	1983–89	1.3[d]	1989–95	−0.9[d]	1995–99	−3.9[d]
		75+	1973–80	3.2[d]	1980–91	2.3[d]	1991–99	−0.9[d]		

(*continued*)

TABLE 2
(*continued*)

			Mortality							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
	Black, females	All ages	1973–75	−0.8	1975–91	1.0[d]	1991–99	−0.4[d]		
		< 20	1973–99	−2.0[d]						
		20–49	1973–76	−4.2[d]	1976–92	−0.7[d]	1992–99	−1.9[d]		
		< 50	1973–76	−4.3[d]	1976–92	−0.8[d]	1992–99	−1.9[d]		
		50–64	1973–87	0.7[d]	1987–99	−1.2[d]				
		65–74	1973–76	−2.0	1976–93	1.6[d]	1993–99	−0.7[d]		
		75+	1973–82	2.8[d]	1982–99	1.4[d]				
Lung and bronchus	All races, both sexes	All ages	1973–80	3.0[d]	1980–90	1.8[d]	1990–97	−0.2	1997–99	−1.9[d]
		< 50	1973–80	−0.4[d]	1980–91	−2.4[d]	1991–94	−4.6[d]	1994–99	−2.5[d]
		50–64	1973–79	2.6[d]	1979–88	1.2[d]	1988–93	−1.3[d]	1993–99	−3.2[d]
		65–74	1973–82	3.4[d]	1982–91	2.0[d]	1991–97	0.2	1997–99	−2.0[d]
		75+	1973–80	4.2[d]	1980–91	3.4[d]	1991–97	1.5[d]	1997–99	−0.2
	All races, males	All ages	1973–80	2.2[d]	1980–90	0.7[d]	1990–97	−1.5[d]	1997–99	−2.8[d]
		< 50	1973–80	−1.6[d]	1980–90	−3.0[d]	1990–99	−4.0[d]		
		50–64	1973–78	1.6[d]	1978–88	0.2	1988–93	−2.2[d]	1993–99	−3.9[d]
		65–74	1973–80	2.2[d]	1980–90	0.6[d]	1990–97	−0.8[d]	1997–99	−3.0[d]
		75+	1973–77	4.6[d]	1977–83	3.1[d]	1983–91	1.6[d]	1991–99	−0.8[d]
	All races, females	All ages	1973–82	6.1[d]	1982–90	4.1[d]	1990–95	1.9[d]	1995–99	0.2
		< 50	1973–78	3.0[d]	1978–87	−0.9[d]	1987–99	−2.3[d]		
		50–64	1973–82	5.7[d]	1982–90	2.5[d]	1990–99	−1.4[d]		
		65–74	1973–83	8.9[d]	1983–92	4.8[d]	1992–99	1.1[d]		
		75+	1973–92	6.8[d]	1992–97	3.7[d]	1997–99	1.3		
	White, both sexes	All ages	1973–80	2.9[d]	1980–90	1.8[d]	1990–97	−0.1	1997–99	−1.9[d]
		< 50	1973–81	−0.6[d]	1981–91	−2.5[d]	1991–94	−4.7[d]	1994–99	−2.5[d]
		50–64	1973–78	2.8[d]	1978–88	1.3[d]	1988–93	−1.1[d]	1993–99	−3.1[d]
		65–74	1973–82	3.3[d]	1982–91	1.9[d]	1991–97	0.4[d]	1997–99	−1.8[d]
		75+	1973–77	4.8[d]	1977–91	3.4[d]	1991–97	1.5[d]	1997–99	−0.2
	White, males	All ages	1973–80	2.1[d]	1980–90	0.6[d]	1990–97	−1.4[d]	1997–99	−2.7[d]
		< 50	1973–81	−1.9[d]	1981–91	−3.1[d]	1991–94	−5.2[d]	1994–99	−3.0[d]
		50–64	1973–78	1.4[d]	1978–88	0.2	1988–93	−2.1[d]	1993–99	−3.9[d]
		65–74	1973–80	1.9[d]	1980–90	0.5[d]	1990–97	−0.7[d]	1997–99	−2.8[d]
		75+	1973–77	4.6[d]	1977–83	3.0[d]	1983–91	1.4[d]	1991–99	−0.8[d]
	White, females	All ages	1973–82	6.2[d]	1982–90	4.2[d]	1990–95	2.1[d]	1995–99	0.2
		< 50	1973–78	3.2[d]	1978–87	−0.7[d]	1987–99	−2.5[d]		
		50–64	1973–82	5.6[d]	1982–90	2.5[d]	1990–96	−0.7	1996–99	−3.1[d]
		65–74	1973–83	9.1[d]	1983–92	4.7[d]	1992–99	1.2[d]		
		75+	1973–92	6.9[d]	1992–97	3.8[d]	1997–99	1.0		
	Black, both sexes	All ages	1973–81	3.4[d]	1981–90	1.9[d]	1990–99	−0.9[d]		
		< 50	1973–77	0.9	1977–91	−1.9[d]	1991–99	−3.7[d]		
		50–64	1973–82	2.9[d]	1982–90	0.2	1990–99	−3.0[d]		
		65–74	1973–88	4.0[d]	1988–95	0.7	1995–99	−2.6[d]		
		75+	1973–88	4.9[d]	1988–99	2.0[d]				
	Black, males	Al ages	1973–81	3.1[d]	1981–89	1.6[d]	1989–93	−0.8	1993–99	−2.6[d]
		< 50	1973–77	0.6	1977–91	−2.4[d]	1991–99	−5.0[d]		
		50–64	1973–82	1.9[d]	1982–90	−0.4	1990–99	−3.4[d]		
		65–74	1973–82	4.3[d]	1982–89	2.3[d]	1989–95	−1.2	1995–99	−4.0[d]
		75+	1973–88	4.9[d]	1988–94	1.2[d]	1994–99	−0.9		
	Black, females	All ages	1973–82	6.2[d]	1982–91	3.8[d]	1991–99	1.2[d]		
		< 50	1973–99	−0.9[d]						
		50–64	1973–81	8.2[d]	1981–90	2.3[d]	1990–99	−2.0[d]		
		65–74	1973–92	7.1[d]	1992–99	1.1				
		75+	1973–91	6.7[d]	1991–99	4.6[d]				

(*continued*)

TABLE 2
(*continued*)

			Mortality							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
Colon and rectum	All races, both sexes	All ages	1973–78	0.0	1978–85	−0.8[d]	1985–99	−1.7[d]		
		< 50	1973–91	−2.0[d]	1991–99	−0.4				
		50–64	1973–85	−0.9[d]	1985–99	−1.9[d]				
		65–74	1973–84	−0.5[d]	1984–99	−2.0[d]				
		75+	1973–80	0.4	1980–90	−1.1[d]	1990–99	−1.8[d]		
	All races, males	Al ages	1973–79	0.5	1979–87	−0.6[d]	1987–99	−2.0[d]		
		< 50	1973–99	−1.4[d]						
		50–64	1973–85	−0.2	1985–99	−1.6[d]				
		65–74	1973–85	−0.1	1985–99	−2.0[d]				
		75+	1973–80	0.9[d]	1980–90	−0.8[d]	1990–99	−2.4[d]		
	All races, females	All ages	1973–80	−0.5[d]	1980–99	−1.7[d]				
		< 50	1973–89	−2.7[d]	1989–99	−0.4				
		50–64	1973–85	−1.6[d]	1985–99	−2.2[d]				
		65–74	1973–84	−1.1[d]	1984–99	−2.1[d]				
		75+	1973–81	0.1	1981–99	−1.4[d]				
	White, both sexes	All ages	1973–78	−0.1	1978–84	−0.8[d]	1984–99	−1.8[d]		
		< 50	1973–93	−2.2[d]	1993–99	−0.2				
		50–64	1973–85	−1.0[d]	1985–99	−2.1[d]				
		65–74	1973–84	−0.6[d]	1984–99	−2.1[d]				
		75+	1973–78	0.5	1978–84	−0.6	1984–99	−1.7[d]		
	White, males	All ages	1973–79	0.4	1979–87	−0.8[d]	1987–99	−2.1[d]		
		< 50	1973–99	−1.6[d]						
		50–64	1973–85	−0.3[d]	1985–99	−1.9[d]				
		65–74	1973–78	0.6	1978–85	−0.6[d]	1985–99	−2.1[d]		
		75+	1973–80	0.7[d]	1980–90	−1.0[d]	1990–99	−2.5[d]		
	White, females	All ages	1973–80	−0.6[d]	1980–99	−1.8[d]				
		< 50	1973–89	−3.1[d]	1989–99	−0.7[d]				
		50–64	1973–84	−1.7[d]	1984–99	−2.4[d]				
		65–74	1973–84	−1.2[d]	1984–99	−2.3[d]				
		75+	1973–81	−0.1	1981–99	−1.6[d]				
	Black, both sexes	All ages	1973–85	1.1[d]	1985–99	−0.3[d]				
		< 50	1973–99	−0.5[d]						
		50–64	1973–99	0.0						
		65–74	1973–89	0.5[d]	1989–99	−0.9[d]				
		75+	1973–85	2.0[d]	1985–99	−0.1				
	Black, males	All ages	1973–90	1.3[d]	1990–99	−1.0[d]				
		< 50	1973–99	−0.3						
		50–64	1973–99	0.7[d]						
		65–74	1973–85	1.5[d]	1985–97	−0.1	1997–99	−6.0		
		75+	1973–90	1.9[d]	1990–99	−1.4[d]				
	Black, females	All ages	1973–85	0.7[d]	1985–99	−0.5[d]				
		< 50	1973–99	−0.7[d]						
		50–64	1973–99	−0.8[d]						
		65–74	1973–99	−0.4[d]						
		75+	1973–85	1.8[d]	1985–99	−0.1				
Female breast	All races	All ages	1973–79	−0.3	1979–89	0.6[d]	1989–95	−1.4[d]	1995–99	−3.2[d]
		< 50	1973–80	−1.5[d]	1980–89	0.1	1989–97	−2.7[d]	1997–99	−7.4[d]
		50–64	1973–89	−0.1	1989–99	−2.7[d]				
		65–74	1973–75	−1.7	1975–89	1.1[d]	1989–94	−1.2	1994–99	−3.3[d]
		75+	1973–93	1.0[d]	1993–99	−1.3[d]				
	White	All ages	1973–79	−0.3	1979–89	0.5[d]	1989–95	−1.6[d]	1995–99	−3.5[d]
		< 50	1973–79	−1.7[d]	1979–90	−0.4	1990–97	−3.4[d]	1997–99	−8.2[d]
		50–64	1973–89	−0.2[d]	1989–99	−3.0[d]				
		65–74	1973–89	0.9[d]	1989–94	−1.3	1994–99	−3.5[d]		
		75+	1973–79	0.0	1979–93	1.1[d]	1993–99	−1.6[d]		

(*continued*)

TABLE 2
(*continued*)

			Mortality							
			Line segment 1		Line segment 2		Line segment 3		Line segment 4	
			Year	APC[c]	Year	APC[c]	Year	APC[c]	Year	APC[c]
	Black	All ages	1973–93	1.3[d]	1993–99	−1.2[d]				
		< 50	1973–76	−5.4	1976–87	2.0[d]	1987–99	−1.4[d]		
		50–64	1973–90	1.2[d]	1990–99	−1.0[d]				
		65–74	1973–75	−7.8	1975–94	1.9[d]	1994–99	−2.2		
		75+	1973–99	1.9[d]						
Prostate	All races	All ages	1973–87	0.9[d]	1987–91	3.0[d]	1991–94	−0.7	1994–99	−4.3[d]
		< 50	1973–99	−0.5						
		50–64	1973–87	0.3	1987–90	4.3	1990–99	−3.8[d]		
		65–74	1973–82	0.2	1982–92	1.4[d]	1992–99	−4.7[d]		
		75+	1973–87	1.1[d]	1987–93	2.7[d]	1993–99	−3.8[d]		
	White	All ages	1973–87	0.8[d]	1987–91	3.1[d]	1991–94	−0.9	1994–99	−4.4[d]
		< 50	1973–99	−0.3						
		50–64	1973–87	0.4[d]	1987–90	4.3	1990–99	−4.4[d]		
		65–74	1973–84	0.3[d]	1984–91	1.9[d]	1991–96	−3.7[d]	1996–99	−6.4[d]
		75+	1973–87	0.8[d]	1987–91	3.4[d]	1991–94	0.0	1994–99	−4.1[d]
	Black	All ages	1973–93	2.2[d]	1993–99	−2.5[d]				
		< 50	1973–99	−1.1[d]						
		50–64	1973–87	0.0	1987–90	4.0	1990–99	−2.1[d]		
		65–74	1973–94	1.2[d]	1994–99	−5.5[d]				
		75+	1973–93	2.7[d]	1993–99	−1.9[d]				

[a] Joinpoint analysis of trends allowed for up to three joinpoints based on rates per 100,000 that were age-adjusted to the 2000 U.S. standard population.
[b] Death data are from the National Vital Statistics System of the National Center for Health Statistics; the data cover the entire U.S. population.
[c] The APC is the Annual Percent Change based on rates age-adjusted to the 2000 U.S. standard population using the joinpoint regression program.
[d] The APC is statistically significantly different from zero (two-sided $P < .05$).
[e] Joinpoint results are not shown if less than 10 cases in any year.

cancer deaths in each age group. Prostate carcinoma was the cause of 20% of the cancer deaths in men aged 75 years and older. In persons aged 75 years and older, most cancer death rates including lung, colorectal, prostate, and breast, were higher than rates for persons aged 65-74 years.

Cancer Survival and Prevalence

Once diagnosed with cancer, prognosis (or survival) is more influenced by the type of cancer and extent of the disease than a person's age (Fig. 4). Thus, in contrast to the steady increase in cancer incidence or death rates as a person ages, age does not appreciably affect relative survival rates for many sites. As an indicator of prognosis, men diagnosed with prostate cancer had a five year relative survival of at least 90%, and women diagnosed with breast cancer had a five year relative survival of 84% or higher. For men and women diagnosed with colorectal cancer, the five year relative survival was about 60%. For cancer of the lung, all of the rates were low (less than 20%), but younger patients had better survival (19%) than older patients (9%). However, observed five year survival rates show greater differences by age, with consistently lower rates among older persons, particularly persons aged 75 years and older. These lower observed survival rates reflect death due to other causes as well as to cancer and the presence of comorbidities.

The estimated number of cancer survivors in the United States is 8.9 million, based on data from the SEER Program. About 60% are 65 years and older, and 32% are 75 years and older. These estimates reflect age-specific cancer incidence rates and survival within the total population.

Impact of Age on Projected Cancer Cases 2000 to 2050

Because of complex factors that affect changes in cancer incidence, it is difficult to anticipate what the rates will be over the next 50 years. However, if current cancer incidence rates were applied to the U.S. Census Bureau population projections for the next five decades (Fig. 5), due to population growth and aging, the number of cancer patients is expected to double from 1.3 million to 2.6 million persons between 2000 and

TABLE 3
Average Annual Cancer Incidence Rates[a] and Percent Site Distribution for the 10 Most Frequent Cancers by Sex and Age, SEER and NPCR Areas,[b] United States, 1995–1999

	Male and female rate	Male rate	Female rate	Male and female percent	Male percent	Female percent
All ages						
All sites	475.1	559.5	420.1	100.0	100.0	100.0
Breast	72.7	1.3	131.9	15.2	0.2	30.7
Prostate	68.9	160.6	[c]	14.5	28.6	[c]
Lung and bronchus	68.5	91.5	52.0	14.4	16.3	12.5
Colon and rectum	56.9	67.4	49.0	11.9	11.7	12.2
Urinary bladder	21.6	38.0	9.9	4.5	6.6	2.5
Non-Hodgkin lymphoma	19.1	23.0	15.9	4.0	4.2	3.8
Melanomas of the skin	14.2	17.9	11.5	3.0	3.3	2.7
Corpus and uterus, NOS	13.9	[c]	25.2	2.9	[c]	5.9
Leukemias	12.0	15.6	9.3	2.5	2.8	2.3
Kidney and renal pelvis	11.6	15.9	8.2	2.4	2.9	1.9
Other	115.7	128.3	107.2	24.5	23.4	25.6
Ages < 20 years						
All sites	16.0	16.7	15.1	100.0	100.0	100.0
Leukemias	4.1	4.6	3.6	26.0	27.7	24.1
Brain and other nervous system	2.8	3.0	2.6	17.6	17.8	17.4
Hodgkin lymphoma	1.3	1.3	1.3	7.8	7.5	8.1
Non-Hodgkin lymphoma	1.1	1.4	0.7	6.7	8.5	4.5
Soft tissue including heart	0.9	0.9	0.9	5.7	5.5	6.0
Bones and joints	0.9	1.0	0.8	5.6	5.9	5.4
Kidney and renal pelvis	0.7	0.6	0.8	4.4	3.6	5.2
Other endocrine including thymus	0.5	0.6	0.4	3.3	3.8	2.7
Thyroid	0.5	0.2	0.9	3.2	1.1	5.8
Testis	0.5	0.9	[c]	3.0	5.6	[c]
Other	2.7	2.2	3.1	16.6	13.0	20.8
Ages 20–49						
All sites	145.5	111.8	178.5	100.0	100.0	100.0
Breast	35.9	0.3	70.6	24.4	0.2	39.2
Melanomas of the skin	10.6	10.0	11.2	7.4	9.0	6.4
Colon and rectum	9.1	9.7	8.5	6.2	8.5	4.8
Lung and bronchus	8.9	9.9	8.0	6.0	8.6	4.4
Non-Hodgkin lymphoma	8.3	10.7	6.0	5.8	9.7	3.4
Thyroid	7.7	3.2	12.2	5.4	2.9	7.0
Cervix	6.5	[c]	13.0	4.6	[c]	7.4
Testis	5.1	10.2	[c]	3.6	9.5	[c]
Ovary	4.9	[c]	9.8	3.4	[c]	5.5
Oral cavity and pharynx	4.4	6.3	2.5	3.0	5.5	1.4
Other	44.1	51.5	36.7	30.3	46.0	20.6
Ages 50–64 years						
All sites	864.8	934.2	802.8	100.0	100.0	100.0
Breast	156.7	2.3	299.3	18.0	0.3	37.1
Prostate	134.6	281.8	[c]	15.7	30.3	[c]
Lung and bronchus	129.0	157.2	103.2	15.0	16.8	13.0
Colon and rectum	85.4	101.8	70.4	9.9	10.9	8.8
Corpus and uterus, NOS	33.9	[c]	65.1	3.9	[c]	8.1
Urinary bladder	32.5	51.7	14.9	3.8	5.5	1.9
Non-Hodgkin lymphoma	31.3	36.5	26.4	3.6	3.9	3.3
Melanomas of the skin	26.2	33.4	19.6	3.0	3.6	2.4
Oral cavity and pharynx	25.3	38.7	12.9	2.9	4.1	1.6
Kidney and renal pelvis	24.2	33.1	15.9	2.8	3.5	2.0
Other	185.7	197.7	175.1	21.4	21.1	21.8
Ages 65–74 years						
All sites	2006.6	2604.9	1527.4	100.0	100.0	100.0
Prostate	414.7	931.5	[c]	20.7	35.8	[c]
Lung and bronchus	357.0	473.0	264.2	17.8	18.2	17.3
Breast	243.0	5.3	434.1	12.1	0.2	28.4

(*continued*)

TABLE 3
(*continued*)

	Male and female rate	Male rate	Female rate	Male and female percent	Male percent	Female percent
Colon and rectum	240.6	293.8	198.0	12.0	11.3	13.0
Urinary bladder	100.0	170.8	43.4	5.0	6.5	2.8
Non-Hodgkin lymphoma	68.8	80.0	59.9	3.4	3.1	3.9
Corpus and uterus, NOS	54.6	[c]	98.5	2.7	[c]	6.4
Kidney and renal pelvis	48.0	66.9	32.8	2.4	2.6	2.1
Pancreas	47.3	55.2	41.0	2.4	2.1	2.7
Melanomas of the skin	41.2	59.4	26.5	2.1	2.3	1.7
Other	391.4	469.0	329.0	19.5	18.0	21.6
Ages 75+ years						
All sites	2398.8	3210.2	1931.4	100.0	100.0	100.0
Colon and rectum	400.3	472.5	358.7	16.7	14.5	18.7
Lung and bronchus	359.6	535.6	257.8	15.0	16.9	13.2
Prostate	332.6	899.3	[c]	13.9	28.3	[c]
Breast	290.0	8.3	455.6	12.1	0.3	23.5
Urinary bladder	146.5	282.7	69.3	6.1	8.7	3.6
Non-Hodgkin lymphoma	97.3	117.7	85.8	4.1	3.7	4.4
Pancreas	76.7	83.4	72.9	3.2	2.6	3.8
Leukemias	67.9	95.6	52.4	2.8	2.9	2.7
Stomach	58.6	86.2	42.9	2.4	2.6	2.3
Corpus and uterus, NOS	55.9	[c]	89.4	2.3	[c]	4.6
Other	513.4	628.9	446.6	21.4	19.5	23.2

[a] Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.

[b] Source is SEER and NPCR areas reported by North American Association of Central Cancer Registries as meeting high data quality standards. The areas cover approximately 55% of the U.S. population: California (Los Angeles and Greater Bay area), Colorado, Connecticut. Delaware, Georgia (Atlanta area), Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Michigan (Detroit area), Minnesota, Nebraska, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, Rhode Island, Utah, Washington (Seattle area), West Virginia, Wisconsin, Wyoming.

[c] Category not applicable or fewer than 25 cases.

SEER: Surveillance, Epidemiology and End Results Program; NPCR: National Program of Cancer Registries; NOS: not otherwise specified.

2050. In addition, the number and proportion of older persons with cancer are expected to increase dramatically. For example, in 2000 an estimated 389,000 persons aged 75 years and older are expected to be newly diagnosed with cancer, in contrast to a projection of nearly 1,102,000 persons in 2050, an increase from 30% to 42% of the cancer population aged 75 years and older. The number of cancer patients aged 85 years and older is expected to increase by more than four-fold between 2000 and 2050. Of more immediate concern, within the next 30 years, the absolute number of cancers occurring in persons aged 65 years and older is expected to double.

Race/Ethnic Incidence and Death Rates (White, Black, API, AI/AN, Hispanic)

Cancer incidence rates from SEER for all sites combined for men in the five racial and ethnic populations showed that black men had the highest cancer incidence and death rates for each age group, except persons under age 20 years during 1995-1999 (Tables 5 and 6). White and Hispanic men had the same death rate in the younger than 20 years age group (Table 6). White women had the highest cancer incidence rates for all sites combined for each age group (Table 5), and black women had the highest cancer death rates (Table 6). In addition, AI/AN men and women had the lowest cancer incidence rates for all sites combined regardless of age (Table 5), while the age-specific cancer death rates for AI/AN, API, and Hispanic populations were lower than for white and black populations (Table 6).

Black men and women almost always had the highest colorectal cancer incidence and death rates during 1995-1999 (Tables 5 and 6). This high ranking persisted in all age groups for both men and women for incidence and death rates with one exception: white men aged 75 years and older had the highest colorectal cancer incidence rates. Among women, Hispanic women generally had the lowest colorectal cancer incidence and death rates. Among men, the lowest rates varied by age among Hispanic, API, and AI/AN men.

Black men had the highest lung cancer incidence and mortality rates in all age groups during 1995-1999 (Tables 5 and 6). Among women, black women had higher lung cancer incidence and death rates than

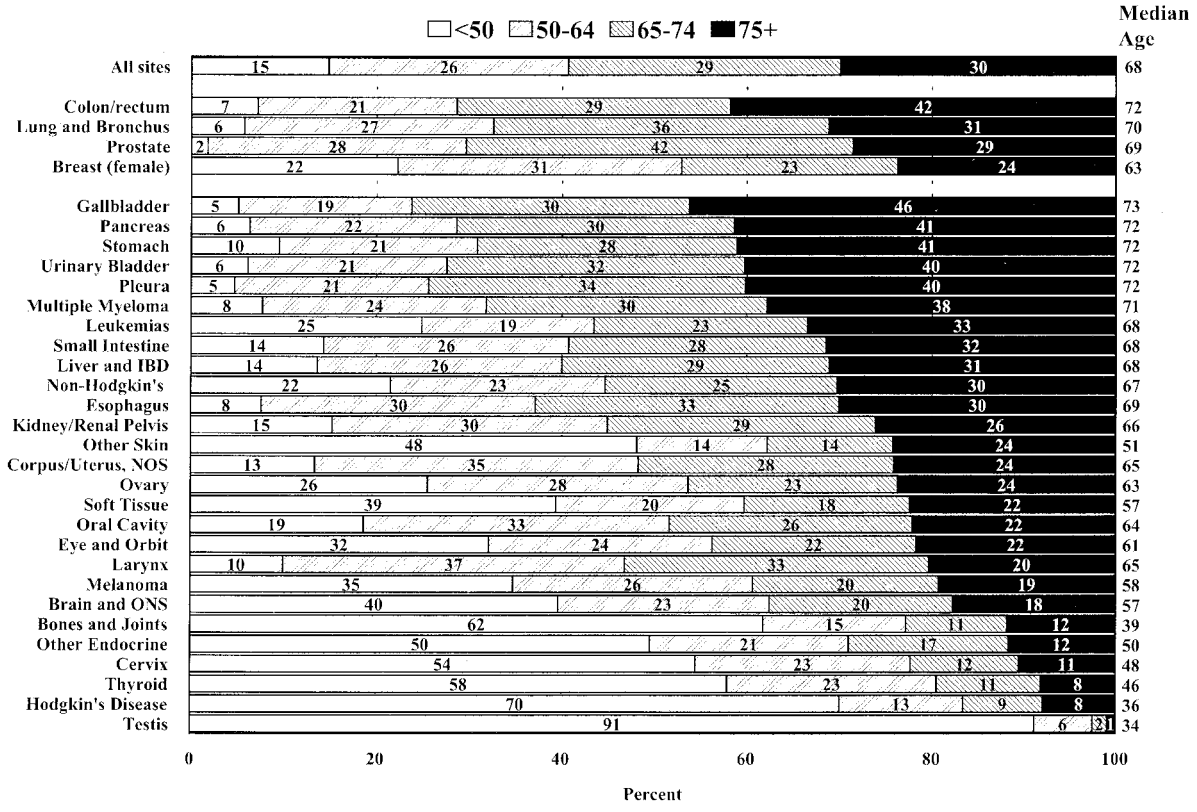

FIGURE 3. Age distribution and median age for the incidence of major cancers, Surveillance, Epidemiology and End Results (SEER) Program and the National Program of Cancer Registries (NPCR) areas reported by the North American Association of Central Cancer Registries (NAACCR), 1995-1999. Percents may not add to 100 due to rounding. Cancer data from SEER and NPCR areas reported by NAACCR as meeting high data quality standards. The areas cover approximately 55% of the U.S. population: California (Los Angeles and Greater Bay area), Colorado, Connecticut, Delaware, Georgia (Atlanta area), Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Michigan (Detroit area), Minnesota, Nebraska, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, Rhode Island, Utah, Washington (Seattle area), West Virginia, Wisconsin, and Wyoming.

white women until age 64 years; after age 64, white women had the higher rates. Hispanic men had the lowest lung cancer incidence and death rates for all age groups, except AI/AN men, who had the lowest lung cancer incidence rate among men aged 75 years and older. Hispanic women had the lowest lung cancer death rates in all age groups, but the lowest age-specific incidence rates among women varied between Hispanic and AI/AN women.

White women had the highest incidence rates of breast cancer for all ages combined during 1995-1999; the lowest age-specific incidence rates occurred in AI/AN women (Table 5). Age-specific breast cancer death rates were different. Black women had the highest death rates regardless of age and API women had the lowest age-specific death rates, except for women under age 50 (Table 6). Regardless of age, black men had the highest prostate cancer incidence and death rates during 1995-1999 (Tables 5 and 6). In general, AI/AN men had the lowest prostate cancer incidence rates (Table 5), and API men had the lowest death rates (Table 6).

DISCUSSION

The current report examined recent rates and trends in cancer incidence and mortality and considered the impact of aging on the future cancer burden, including characteristics of the growing population of cancer survivors. Progress against cancer can be measured by the reductions in the rate of cancer deaths at each age, as well as shifts in detecting cancer at earlier and more treatable stages of disease at diagnosis. Advances in cancer control and the application of effective interventions, as well as improved access to state-of-the-art cancer care, should lead to further reductions in cancer death rates.[25] However, even with these improvements, the aging of the U.S. population alone will increase the number of persons who are diagnosed and treated for cancer and who will survive longer at increasingly older ages.

TABLE 4
Average Annual Cancer Death Rates[a] and Percent Site Distribution for the 10 Most Frequent Cancers by Sex and Age, United States[b] 1995–1999

	Male and female rate	Male rate	Female rate	Male and female percent	Male percent	Female percent
All ages						
All malignant cancers	205.9	259.1	171.4	100.0	100.0	100.0
Lung and bronchus	57.7	81.2	41.0	28.2	32.2	23.7
Colon and rectum	21.7	26.3	18.5	10.5	10.0	11.1
Breast	16.4	0.3	28.8	7.9	0.1	16.3
Prostate	12.6	33.9	[c]	6.1	11.7	[c]
Pancreas	10.6	12.2	9.3	5.1	4.8	5.5
Non-Hodgkin lymphoma	8.7	10.8	7.2	4.2	4.2	4.3
Leukemias	7.8	10.4	6.0	3.8	4.0	3.5
Ovary	5.1	[c]	9.0	2.5	[c]	5.2
Stomach	5.0	7.1	3.5	2.4	2.7	2.1
Brain and other nervous system	4.7	5.7	3.9	2.3	2.4	2.2
Other	55.6	71.2	44.2	26.9	27.8	26.0
< 20 years						
All malignant cancers	2.9	3.2	2.6	100.0	100.0	100.0
Leukemias	0.9	1.1	0.8	32.1	32.7	31.4
Brain and other nervous system	0.7	0.8	0.6	24.4	23.6	25.4
Other endocrine	0.2	0.3	0.2	8.2	8.4	7.8
Bones and joints	0.2	0.3	0.2	7.8	8.0	7.6
Soft tissue including heart	0.2	0.2	0.2	6.6	6.3	6.9
Non-Hodgkin lymphoma	0.2	0.2	0.1	5.5	6.7	3.8
Kidney and renal pelvis	0.1	0.1	0.1	2.8	2.2	3.6
Liver and intrahepatic bile duct	0.1	0.1	0.1	2.5	2.6	2.4
Hodgkin disease	0.0	0.0	0.0	1.5	1.3	1.8
Colon and rectum	0.0	0.0	0.0	0.8	0.8	0.7
Other	0.3	0.1	0.3	7.8	7.2	8.7
20–49 years						
All malignant cancers	35.2	33.7	36.7	100.0	100.0	100.0
Lung and bronchus	6.1	7.2	5.0	17.1	21.1	13.4
Breast	5.6	0.0	11.0	15.8	0.1	29.9
Colon and rectum	2.7	2.9	2.4	7.5	8.6	6.6
Brain and other nervous system	2.1	2.6	1.6	6.0	7.7	4.4
Non-Hodgkin lymphoma	2.0	2.7	1.3	5.8	8.2	3.6
Leukemias	1.9	2.2	1.6	5.5	6.7	4.4
Cervix	1.3	[c]	2.6	3.8	[c]	7.1
Melanoma of the skin	1.3	1.6	0.9	3.6	4.7	2.6
Pancreas	1.2	1.5	0.9	3.4	4.5	2.5
Ovary	1.0	[c]	2.1	2.9	[c]	5.6
Other	10.0	13.0	7.3	28.6	38.3	19.9
50–64 years						
All malignant cancers	304.3	343.1	269.1	100.0	100.0	100.0
Lung and bronchus	98.7	127.1	72.8	32.5	37.1	27.2
Breast	29.7	0.5	56.5	9.7	0.1	20.8
Colon and rectum	26.7	32.3	21.6	8.8	9.4	8.0
Pancreas	15.0	18.4	11.9	4.9	5.4	4.5
Non-Hodgkin lymphoma	11.2	14.1	8.6	3.7	4.1	3.2
Brain and other nervous system	8.9	10.7	7.2	2.9	3.1	2.7
Leukemias	8.5	10.5	6.6	2.8	3.1	2.5
Ovary	8.5	[c]	16.3	2.8	[c]	6.0
Esophagus	8.4	14.6	2.8	2.8	4.3	1.0
Kidney and renal pelvis	7.5	10.8	4.5	2.5	3.1	1.7
Other	81.2	104.1	60.3	26.7	30.3	22.4

(*continued*)

TABLE 4
(*continued*)

	Male and female rate	Male rate	Female rate	Male and female percent	Male percent	Female percent
65–74 years						
All malignant cancers	852.5	1067.1	680.3	100.0	100.0	100.0
Lung and bronchus	294.3	404.4	205.8	34.5	37.9	30.3
Colon and rectum	81.9	102.7	65.2	9.6	9.6	9.6
Breast	53.7	1.1	95.9	6.3	0.1	14.1
Pancreas	44.4	52.1	38.2	5.2	4.9	5.6
Prostate	44.4	100.0	[c]	5.2	9.3	[c]
Non-Hodgkin lymphoma	32.9	39.8	27.4	3.9	3.7	4.0
Leukemias	27.6	37.7	19.4	3.2	3.5	2.9
Ovary	20.4	[c]	36.8	2.4	[c]	5.4
Esophagus	20.0	35.1	7.8	2.3	3.3	1.2
Liver and intrahepatic bile duct	19.0	27.6	12.1	2.2	2.6	1.8
Other	213.9	266.6	171.7	25.1	25.0	25.2
75+ years						
All malignant cancers	1454.8	2013.3	1148.3	100.0	100.0	100.0
Lung and bronchus	344.9	534.3	236.3	23.8	27.4	20.2
Colon and rectum	184.9	221.3	164.0	12.7	10.9	14.5
Prostate	143.8	418.0	[c]	9.9	19.9	[c]
Breast	98.1	2.7	151.4	6.7	0.1	13.2
Pancreas	80.6	88.7	75.8	5.5	4.4	6.6
Non-Hodgkin lymphoma	65.6	79.8	57.7	4.5	4.0	5.0
Leukemias	59.9	84.1	46.4	4.1	4.2	4.1
Urinary bladder	44.7	81.7	25.0	3.1	3.9	2.2
Stomach	39.2	56.5	29.4	2.7	2.8	2.6
Ovary	33.7	[c]	53.1	2.3	[c]	4.6
Other	359.4	446.2	309.2	24.7	22.4	27.0

[a] Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.
[b] Source: Death data are from the National Vital Statistics System of the National Center for Health Statistics; the data cover the entire U.S. population.
[c] Category not applicable or fewer than 25 cases.

Age-adjusted cancer incidence rates for all cancers combined remained essentially constant during the most recent reporting period (1995-1999), whereas death rates decreased during the period 1993 through 1999. The stable pattern of overall age-adjusted cancer incidence rates in the past five years is a complex mix of different trends in age-specific cancer rates, particularly for the more common cancers. The relatively constant rate includes continuing increases in cancer incidence rates among women aged 65-74 years, increases in breast cancer among women aged 50-64 years, increases in colorectal cancer for women under age 50 years, increases in prostate cancer for men under age 65 years, and increases in lung cancer for persons aged 75 years and older. These increases are offset by declines in lung and colorectal cancer incidence for men at all but the oldest ages.

In contrast, the death rate for all cancers combined continued to decrease in the entire U.S. population through 1999. The decline in cancer death rates accelerated during the 1990s in most age groups of men and women, with the notable exception of a slowing of the increase in lung cancer death rates in older aged women. The long-term temporal trends in cancer mortality reflect a combination of birth cohort effects in exposures as such tobacco use and period effects from the introduction of screening combined with more effective treatments for breast and colorectal cancers, as well as improved medical management for prostate cancers.[26] Birth cohort patterns in cigarette smoking have a strong but delayed effect on both incidence and death rates from cancer, leading to the progressive increase and later decrease in lung cancer incidence and mortality rates. Both the uptake of regular cigarette smoking and reductions in smoking prevalence occurred earlier in men than in women in the United States.

Many factors influence the age-adjusted cancer incidence trends. Routine screening has not only increased in the population, but it also has improved the prognosis for cancer patients, especially persons diagnosed with early stage disease. The widespread introduction of mammography in the 1980s coincided with

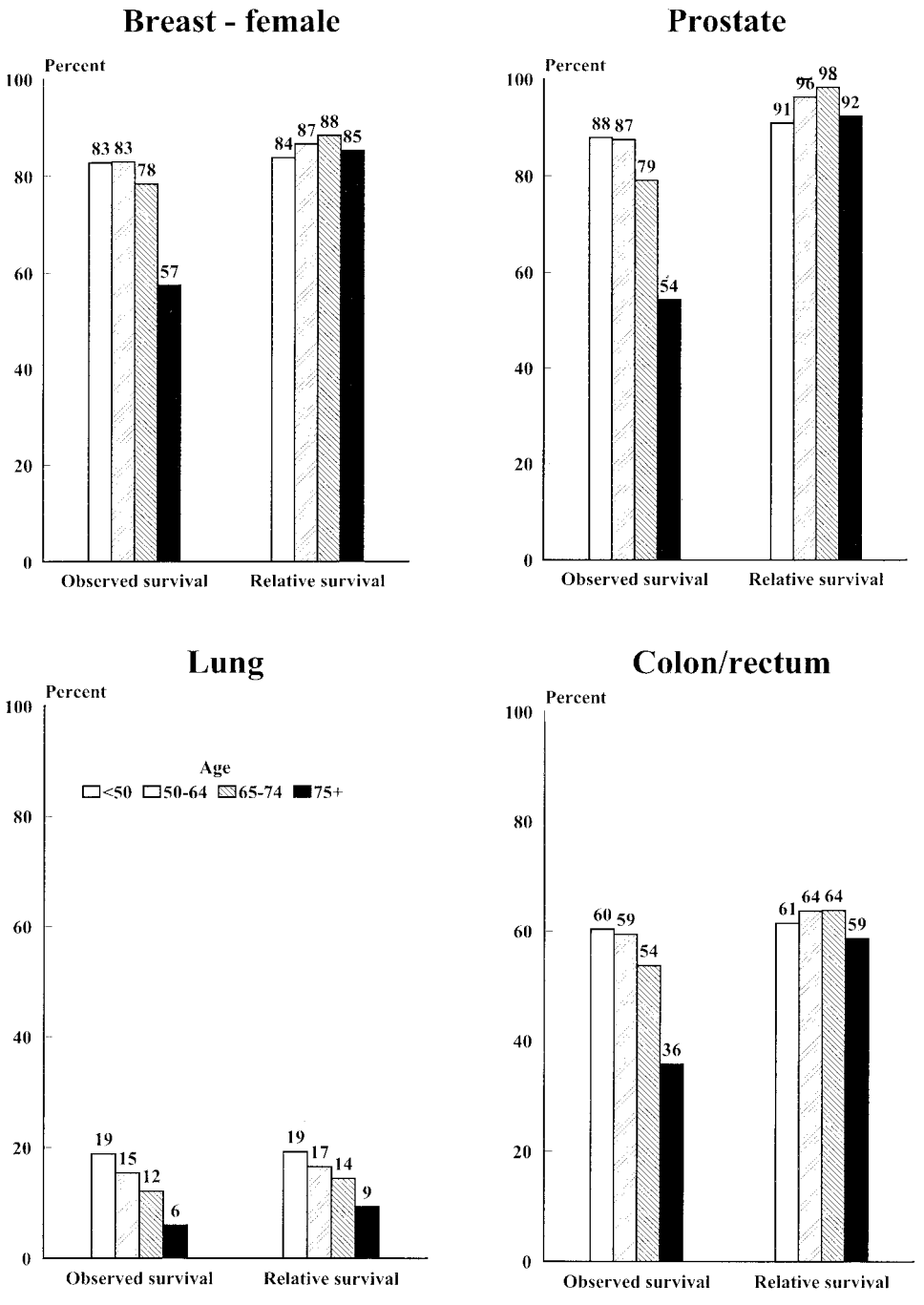

FIGURE 4. Five-year observed and relative survival rates by selected site and age, Surveillance, Epidemiology, and End Results (SEER) Program, 1990-1998. Survival rates are expressed as percents for 1990-1998 data, followed through 1999, and are based on SEER registries covering 10% of the U.S. population: metropolitan areas of San Francisco-Oakland, Detroit, Atlanta, and Seattle-Puget Sound; and states of Connecticut, Hawaii, Iowa, Utah, and New Mexico.

a sharp increase in breast cancer incidence. Trends in the diagnosis of breast cancer continue to rise, particularly early stage disease among women aged 50-64 years (data not shown). Changes in medical management (surgery and pathology) of women with breast cancer may have affected the recent increase in the trend for node positive disease (data not shown). For men, the promotion of prostate specific antigen screening created a sharp increase in prostate cancer incidence between 1988 and 1992. For men and women, the modest increase in colorectal screening may have contributed to the observed increases in incidence during the 1990s in some age, sex, and race groups. Future advances in tests for the early detection of cancers, such as patterns of proteins found in patients' blood,[27] may alter cancer incidence trends further. Increases in screening are typically reflected by period increases in cancer incidence, meaning that the increase occurs simultaneously across all age groups receiving the screening.

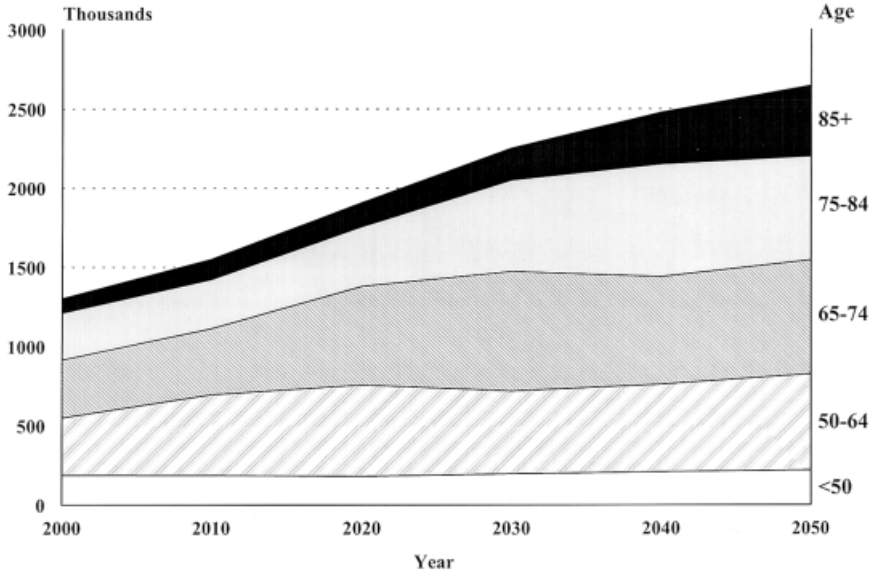

FIGURE 5. Projected number of cancer cases for 2000 through 2050 based on projected census population estimates and age-specific cancer incidence rates, Surveillance, Epidemiology and End Results (SEER) Program and the National Program of Cancer Registries (NPCR) areas reported by the North American Association of Central Cancer Registries (NAACCR), 1995-1999. Projections based on current (1995-1999) age-specific incidence rates applied to projected census populations for 2000 to 2050. Population data from census populations 2000 - 2050. Cancer data from SEER and NPCR areas reported by NAACCR as meeting high data quality standards. The areas cover approximately 55% of the U.S. population: California (Los Angeles and Greater Bay area), Colorado, Connecticut, Delaware, Georgia (Atlanta area), Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Michigan (Detroit area), Minnesota, Nebraska, New Jersey, New Mexico, New York, North Carolina, Pennsylvania, Rhode Island, Utah, Washington (Seattle area), West Virginia, Wisconsin, Wyoming.

Cancer occurs predominantly in older persons, with a median age at diagnosis of 68 years. The number of cancer survivors is growing, as is the proportion of individuals aged 65 years and older. This represents an important group of persons with unique needs and risks for cancer.[28] However, the proportion of patients in this age category is under-represented in clinical trials.[29,30] Clinical trials are the most valued resource for identifying promising new interventions, and for evaluating the effectiveness of new interventions compared to standard ones. Since March 1998, more than 177,000 patients have enrolled in NCI-sponsored Phase III trials, and one-quarter were aged 65 or older at the time of study entry. Categorized by the most common tumors (e.g., breast, prostate, colorectal, or lung), the percentages enrolled were 17%, 72%, 45%, and 43%, respectively. Among 52,000 patients enrolled in NCI-sponsored earlier phase (e.g., Phases I, I/II, and II) clinical trials since 1998, 28% were aged 65 years or older. Although efforts are underway to implement and evaluate several key pilot studies designed to improve access to the nationwide clinical trials system, specific strategies are needed to increase the proportion of older patients on appropriately designed clinical trials.

Older age patients with cancer present many challenges to practicing health care providers. There is a limited knowledge base of drug-drug interactions with new therapies in older age patients. Older patients are more likely to be on a variety of medicines that interact with their anti-tumor therapy and thus are at heightened risk for drug-drug interactions and overlapping toxicities. In addition, underlying physiologic changes in organ function, in the absence of polypharmacy, may place older patients at increased risk for toxicities and result in decreased tolerance for standard regimens.[31–33] Co-morbid conditions, such as vascular disease, may exist, and there may be unknown hazards in exposing a patient with pre-existing risks for a stroke or coronary artery disease to anti-angiogenesis agents.[34–36]

Each of the annual reports has described important progress against cancer.[1–4] These advances result from breakthroughs in treatment and early detection modalities and understanding the biology and behavioral advances to encourage adherence to recommended preventive practices and early detection regimens to avoid or minimize cancer risks. Despite the progress, the future aging of the population will dramatically increase the number of cancers and the age of most cancer patients. Barring major breakthroughs in cancer prevention, projected U.S. population growth and aging are expected to contribute to a progressive and substan-

TABLE 5
Average Annual Cancer Incidence Rates[a] by Age, Sex, and Race/Ethnicity,[b] SEER,[c] 1995–1999

		Male						Female				
		White rate	Black rate	AI/AN rate	API rate	Hispanic rate		White rate	Black rate	AI/AN rate	API rate	Hispanic rate
All sites	All ages	546.1	674.5	268.2	401.6	378.2	All sites	427.0	405.3	228.1	310.6	288.2
	< 20 years	17.4	13.0	9.4	15.5	15.7		16.2	11.4	7.7	13.3	14.7
	20–49 years	111.5	133.6	56.1	76.5	75.8		179.2	162.6	97.8	154.1	137.1
	< 50 years	74.2	85.8	37.6	52.3	52.0		114.6	102.6	62.1	98.3	88.6
	50–64 years	902.7	1372.3	485.0	560.6	601.8		830.5	815.6	486.8	598.1	549.1
	65–74 years	2508.3	3049.5	1167.0	1844.9	1814.8		1538.8	1457.3	776.0	987.5	969.9
	75+ years	3172.2	3401.0	1511.2	2615.8	2161.6		1953.7	1863.3	976.2	1401.0	1286.9
Colon/rectum	All ages	63.1	69.3	41.3	58.9	43.8	Colon/rectum	45.7	55.6	32.6	39.2	29.4
	< 50 years	5.1	7.1	4.6	6.3	4.1		4.5	6.5	4.8	5.5	3.7
	50–64 years	92.6	128.8	86.2	92.4	73.2		64.5	93.7	64.3	62.7	47.6
	65–74 years	269.9	279.1	171.9	251.1	201.9		182.7	228.0	140.4	145.6	114.2
	75+ years	458.6	438.3	225.9	397.4	274.4		343.6	360.4	169.1	268.1	199.7
Lung	All ages	79.8	120.6	50.0	63.1	42.0	Lung	51.4	53.1	22.9	28.6	22.2
	< 50 years	4.3	11.3	4.3	3.9	2.0		3.9	6.2	[d]	2.8	1.7
	50–64 years	129.5	251.0	93.4	91.7	60.3		98.4	115.7	52.9	44.4	36.1
	65–74 years	411.3	566.6	247.9	329.1	215.4		266.9	259.4	80.7	125.9	108.9
	75+ years	498.9	618.7	274.0	411.3	286.1		268.9	235.2	139.6	191.7	137.5
Prostate	All ages	158.7	257.3	56.4	100.9	120.5	Breast	139.0	121.5	59.7	97.9	83.5
	< 50 years	3.3	8.8	[d]	1.2	1.7		42.8	42.2	20.9	39.1	30.5
	50–64 years	286.5	546.7	86.7	108.6	187.7		326.1	286.4	165.7	244.6	196.1
	65–74 years	916.7	1395.3	277.1	584.7	746.2		458.6	359.0	159.2	274.3	253.4
	75+ years	875.0	1272.0	409.1	748.1	692.9		477.9	403.5	153.4	245.8	253.6

[a] Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.

[b] Rates other than for whites and blacks should be interpreted with caution because of possible misreporting and misclassification of race/ethnicity; see text for discussion. Hispanic is not mutually exclusive from whites, blacks, American Indians/Alaska Natives, and Asian/Pacific Islanders.

[c] Source: Incidence data for 1995–1999 are based on SEER registries covering 14% of the U.S. population: metropolitan areas of San Francisco-Oakland, Detroit, Atlanta, Seattle-Puget Sound, Los Angeles, San Jose-Monterey; and states of Connecticut, Hawaii, Iowa, Utah, and New Mexico; and Native Americans residing in Alaska. Hispanic rates exclude Detroit and Hawaii.

[d] Category not applicable or fewer than 25 cases.

SEER: Surveillance, Epidemiology and End Results Program; AI/AN: American Indian/Alaska Native; API: Asian Pacific Islander.

tial increase in the cancer burden, doubling the total number of persons diagnosed with cancer within the next half century as well as the number of cancer patients aged 75 years and older. Thus, the number of persons who require cancer treatment and require it at older ages also will increase, placing a growing demand for more supportive, palliative, and general medical services.[37] The overall costs for cancer are estimated to be $156.7 billion in the year 2001 (Dr. Martin Brown, NCI, personal communications), and will continue to increase.[38]

Even as all Americans are aging, the nation is growing more diverse. In the 2000 U.S. Census,[7] the Hispanic population in the United States was as large as the black population, having nearly doubled during the 1990s. The Census category for Asian/Pacific Islanders (API) also reflects growing numbers and makes up a higher proportion of the U.S. population. Within the API category, the composition of recent immigrants (by country of origin) is different from second generation APIs. Since cancer incidence and death rates vary among the race/ethnic groups, these changes will have implications not only for the cancer burden as these populations grow and age, but also on a greater need for culturally appropriate prevention, early detection, and treatment programs.

Higher incidence and/or death rates among selected racial and ethnic populations show that not all populations have benefited equally from cancer prevention and treatment control efforts.[1–4] Even though rates for these cancers may be relatively low among some populations, greater efforts are needed to overcome negative health disparities. This will require attention to education, costs, access, and cultural appropriateness.

Limitations

Findings in the current report may have methodologic, substantive, and interpretive limitations. Some of the statistically significant findings in analyses that

test multiple comparisons may be due to chance alone. The analyses in this report examined age-specific trends among combinations of age groups (< 20 years, 20-49 years, < 50 years, 50-64 years, 65-74 years, and 75 years and older) plus all ages, with race (all, black, and white), gender (all, women, and men), and the four major types of cancer. With the large number of tests, the report could include results that are statistically spurious.

The impact of shifting from the 1970 standard population to the 2000 standard population has important consequences on the levels and trends of cancer rates. For all sites combined and for most common cancer sites, such as colorectal and prostate cancers, the 2000 standard increased cancer incidence and death rates by 20% to 50% compared to the 1970 standard, due to an increased representation of the older age groups with higher cancer rates. In contrast, the change in population standard attenuates the continued decline in age-adjusted cancer death rates because of a reduced weighting of the younger age groups in which death rates have declined the most. The change to the year 2000 standard conforms to a new federal policy for reporting disease rates.

In addition, use of ICD-10, the new classification for coding cause of death beginning in 1999, may impact cancer death rates. Differences will occur for some specific sites. If trends in site-specific death rates change by an amount that is similar to comparability ratios,[18] it is most likely due to the change in coding. Changes in death rates are still interpretable, despite the changes in the coding and classification system between 1998 and 1999.

Limitations in the trend statistics also must be considered. Results of the joinpoint analysis (JPA) are not comparable to last year's annual report[4] because a different population standard for age-adjustment was used this year, and this change as well as the addition of the 1999 data point may have altered the joinpoints and the direction or magnitude of the APC values. The JPA complicates comparisons across different groups that have different joinpoints and years of inflection. Further, the JPA often shows fewer significant changes in trends for population groups based on small numbers of cases or deaths (e.g., the black population or younger age groups) than for groups based on larger numbers (e.g., the white population or older age groups). However, the JPA is a flexible and accurate approach in identifying the years in which significant changes in trends occurred.

Although the NAACCR combined rate covers nearly 55% of the U.S. population, it may not reflect the United States as a whole. Variability in cancer incidence rates may arise from differences in socio-demographic population characteristics (e.g., race and ethnicity, geography), health behavior (e.g., tobacco use, diet, physical activity), screening utilization, exposure to cancer causing agents, and/or completeness and timeliness of cancer reporting.

Finally, assessment of long-term cancer trends is limited to only white and black populations. Annual population counts at the county level prior to 1990 for other populations are not available. Further, cancer incidence and death rates for some racial and ethnic populations may be limited by problems in ascertaining race and by misreporting race and ethnicity on the basic records (medical records, death certificates, and census reports) from which information is collected on cancer incidence, deaths, and the population at risk.[39–42] Recent studies suggest that reporting race for the white and black population is generally reliable, but biases are more serious for some smaller populations, particularly American Indians.[40,42]

Strategies for the Future

The population-based data in the current report underscore a critical need for an expanded and organized focus on cancer control efforts to serve an aging population and reduce the burden of cancer in the elderly. The impact of future changes in our nation's age structure must be addressed from a multitude of perspectives, including prevention and early detection, social support, treatment and medical care, research, and surveillance. Issues of disparity, access, economics, and quality of life cross-cut all these perspectives.

Prevention and early detection

Medical and scientific agreement is needed about recommendations for screening and early detection of cancer in persons of all ages, specifically recommendations on the appropriate age to begin screening and whether recommendations need to be modified for older age groups. The majority of evidence about screening will come from individuals of all ages, and recommendations about whether to modify recommendations in older individuals will have to come from analyzing subsets of older individuals in these trials. In addition, other methods, including modeling, could be used. Such approaches should consider the substantial decreases that have occurred in the death rates from breast, prostate, and colorectal cancers. Screening for colorectal cancer, in particular, must be increased in all adults aged 50 years and older.[43] Population-based data show the need to expand and organize cancer control efforts for an aging population and to integrate issues of aging in cancer intervention research. It is not enough to develop recommenda-

TABLE 6
Average Annual Cancer Death Rates[a] by Age, Sex, and Race/Ethnicity,[b] United States,[c] 1995–1999

		Male						Female				
		White rate	Black rate	AI/AN rate	API rate	Hispanic rate		White rate	Black rate	AI/AN rate	API rate	Hispanic rate
All sites	All ages	253.0	359.2	156.0	157.1	160.7	All sites	169.8	203.5	112.0	103.6	104.2
	< 20 years	3.3	3.2	2.4	3.0	3.3		2.5	2.8	1.9	2.3	2.8
	20–49 years	31.6	53.5	21.2	24.6	22.3		34.9	52.9	27.3	25.3	26.3
	< 50 years	20.4	33.6	13.7	16.0	14.8		22.1	33.1	17.2	16.2	17.0
	50–64 years	326.6	559.5	234.3	190.3	199.7		264.8	342.6	194.2	153.3	158.1
	65–74 years	1046.5	1440.1	710.7	625.8	662.9		678.8	793.2	473.2	365.5	394.9
	75+ years	1991.0	2582.6	1060.5	1254.0	1264.4		1148.6	1257.0	649.3	740.6	697.9
Colon/rectum	All ages	25.8	34.4	15.8	15.9	16.6	Colon/rectum	18.0	25.4	11.7	11.3	10.3
	< 50 years	1.6	3.0	1.3	1.4	1.2		1.3	2.4	1.3	1.3	1.0
	50–64 years	31.0	50.6	24.2	18.9	21.9		20.4	33.4	18.1	13.2	13.2
	65–74 years	101.1	134.6	65.6	62.1	68.8		62.9	95.0	42.1	40.7	36.9
	75+ years	220.8	261.1	114.0	132.1	130.5		162.1	204.2	87.8	94.7	85.9
Lung	All ages	79.7	109.1	50.4	41.1	37.3	Lung	41.7	40.2	25.3	19.7	13.8
	< 50 years	4.0	8.5	2.3	2.1	1.6		2.9	4.2	1.6	1.6	0.8
	50–64 years	121.7	208.0	86.8	47.8	46.5		74.3	77.6	46.3	25.2	18.4
	65–74 years	400.3	513.6	272.0	203.5	178.3		210.6	198.9	134.6	82.6	62.1
	75+	533.2	626.7	294.2	314.3	288.4		240.9	206.3	138.4	154.7	104.8
Prostate	All ages	31.2	72.8	17.5	14.3	21.6	Breast	28.2	37.1	15.0	13.0	17.2
	< 50 years	0.1	0.3	[d]	[d]	0.1		6.1	11.2	3.9	4.0	4.8
	50–64 years	11.1	36.4	10.2	3.6	8.8		55.0	77.6	32.8	31.7	36.9
	65–74 years	88.8	245.6	56.2	34.2	71.7		96.2	112.1	54.3	36.7	53.4
	75+ years	391.0	842.5	201.9	190.7	256.2		152.3	165.4	61.8	48.1	77.9

[a] Rates are per 100,000 and are age-adjusted to the 2000 U.S. standard population.

[b] Rates other than for whites and blacks should be interpreted with caution because of possible misreporting and misclassification of race/ethnicity; see text for discussion. Hispanic is not mutually exclusive from whites, blacks, American Indians/Alaska Natives, and Asian/Pacific Islanders.

[c] Source: Death data are from the National Vital Statistics System of the National Center for Health Statistics; the data cover the entire U.S. population. Hispanic rates excluded Oklahoma, New York, Connecticut, and New Hampshire.

[d] Category not applicable or fewer than 25 cases.

AI/AN: American Indian/Alaska Native; API: Asian Pacific Islander.

tions; they must be promoted to both patients and their health providers to make a population difference.[44] To date, there has been little focused attention on cancers in older people.[28]

Social support

The interaction of aging, cancer, and the detrimental pathology of aging, like the presence of concomitant diseases, functional limitations, and patient frailty, has had only sporadic research attention. Systematic study is needed to ascertain psychologic and social support resources used by older persons to cope with the effects of cancer and its treatment, issues of quality of life and survivorship, and the relevance of access to care for older patients, their families, and physicians.[45,46] Increasingly in the future, families and friends will assume more caregiving responsibilities for which they are untrained and unaccustomed.[47–49] Also, as care givers are likely to be older persons, they often have their own health problems that limit the support they can provide to others. The situation can be further exacerbated by reduced income, economic stress, limited or diminishing social support networks, loss of loved ones, and changing living arrangements.[50] The relation of these social factors to treatment, survival, and quality of life of older cancer patients must be better understood.

Treatment

The special considerations needed in treating cancer in older persons because of their concomitant illnesses and physical limitations are understudied. Relevant short-term and long-term medical effects include anti-tumor drug alterations due to age and aging, dosage, administration, and special monitoring needs, late life recurrence of cancer, and a possibility of second primary tumors. Advancing age is associated with age-related conditions among which the most prominent life-threatening ones are heart disease, chronic obstructive pulmonary disease, hyper-

tension, and diabetes. The comorbidity burden of newly diagnosed cancer patients and coordination of treatment for these pre-existing problems with cancer treatment also have had limited attention in clinical research.[35,36,51–53] The responses of older patients to cancer treatment in the presence of the normal processes of aging (e.g., changes in body structure, composition, and function) and the pathologic processes of aging (e.g., comorbid conditions) are not well known.[54–57] Age alone is not a reason to modify the standard of care for persons diagnosed with cancer; cancer survival is less a function of age than of general health status or the presence of other diseases.[54,58]

Strategies may include considering placing equal emphasis on treatment of symptoms (e.g., secondary to either the treatment or the underlying tumor) and a greater focus on integrating palliative care issues. Implementation requires integrating new curricula, education and training in geriatrics, and geriatric oncology, perhaps through partnering with professional societies[28] such as the American Society of Clinical Oncology, the American Academy of Family Physicians, the American Association for Cancer Education, and the ACS.

General medical care

With more people vulnerable to cancer, more cancer patients surviving to older ages, and more older survivors who are frail or have additional medical problems, the need and demand for health care providers,[59] particularly nurses in general and for oncology nurses in particular, will grow. All health provider specialties, particularly in nursing, are already facing shortages, the workforce itself is aging, and the shortages are expected to worsen.[60,61] Other health services, such as nursing home care, assisted living, and home health services, are expected to increase to meet not only health care needs, but also the needs of daily living as a cancer survivor. Palliation and end-of-life health and support services will be in greater demand. Attraction and retention of a workforce in the supportive health professions must be incorporated in planning to meet all the health, medical, social, and physical needs of a large number of older cancer survivors. We must also develop the economic infrastructure that will support such a workforce.

Research and public partnerships

Collaborative approaches to integrate extramural research scientific areas in cancer and aging are improving,[62] particularly within the National Institutes of Health and with other federal and private agencies. Partnerships are developing in basic, clinical, and population sciences to meet the critical need for information on aging and cancer. Specifically, the NCI and the National Institute on Aging (NIA) are collaborating in the research arena of clinical medicine, surveillance, and survivorship to address the public health burden of cancer in older persons.[63] Each organization conducts research in survivorship and collaborates with private partners such as the ACS to provide information to cancer patients and their families, improve access to cancer screening and age-appropriate therapy for cancer patients, and facilitate linking cancer patients of all ages with clinical trials. The NCI is working with its clinical trials cooperative groups and community oncology program research base to consider designing and conducting trials that can evaluate cancer therapy in frail older patients, as well as patients with comorbid but not necessarily frail conditions. One of the obstacles to clinical trial access for the older patient may be the organ function eligibility requirements.[64] In addition, the ACS provides numerous services to cancer patients and their families.

Surveillance

The primary resources in the United States for information about cancer rates and trends as applied to information for patients are the National Vital Statistics System, the central cancer registries, surveys of health practices and risk, and linked data systems. While the vital records system has had complete coverage for national and state mortality since 1933,[65] the cancer incidence network has been expanded and improved only in recent years[11] and is still striving to meet national coverage. Both systems enable timely, efficient, and continuous surveillance of cancer occurrence. Further, with cancer registries, descriptions of not only disease burden but also progress are possible; the program impact of tobacco prevention and cessation and breast cancer screening can be shown; patients can be told the probability of surviving specific cancers; and families can be reassured that age does not adversely affect survival from cancer. The information also helps providers meet the health care volume and needs of cancer patients. Policy makers can make appropriate decisions about allocation of scarce resources to most effectively reduce the cancer burden.

The partnership of the institutions and agencies represented in this annual report assures that information about cancer is continually collected in a standard and meaningful way and that data are used and interpreted for their significance to cancer prevention, early detection, treatment, and survival. This collaboration brings a focus to timely issues, forging a comprehensive perspective for setting future directions.

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