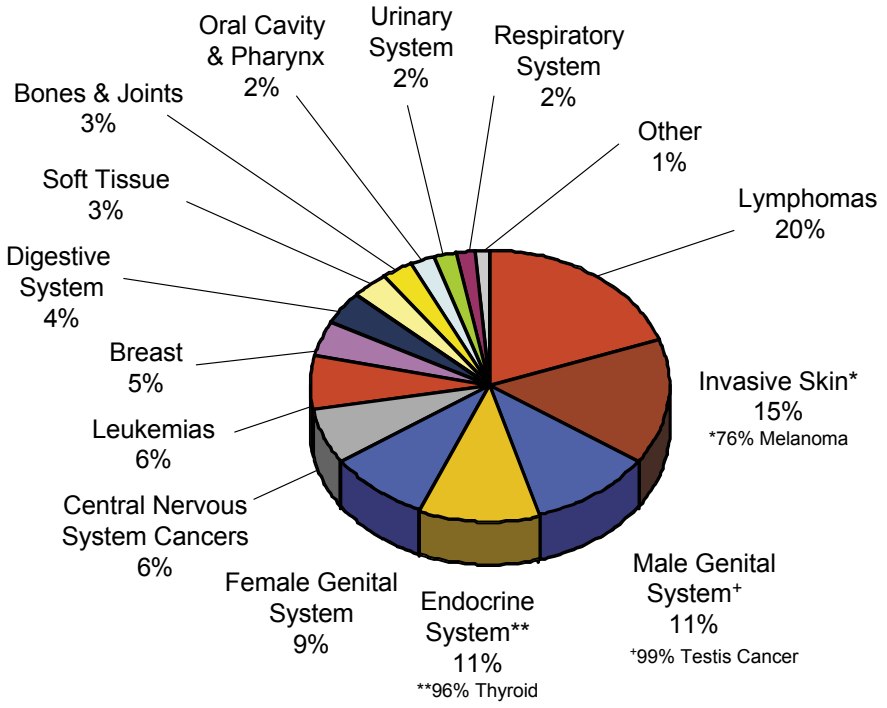
Chapter 1

Introduction

Cancer in 15-29 Year-Olds, U.S. SEER, 1975-2000



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HIGHLIGHTS

Incidence

- Cancer occurring between the ages of 15 and 30 years is 2.7 times more common than cancer occurring during the first 15 years of life, yet is much less common than cancer in older age groups, and accounts for just 2% of all invasive cancer.
- Cancer in adolescents and young adults is unique in the distribution of the types that occur. Hodgkin lymphoma, melanoma, testis cancer, female genital tract malignancies, thyroid cancer, soft-tissue sarcomas, non-Hodgkin lymphoma, leukemia, brain and spinal cord tumors, breast cancer, bone sarcomas, and non-gonadal germ cell tumors account for 95% of the cancers in this age group.
- The frequency distribution of cancer types changes dramatically from age 15 to 30, such that the pattern at the youngest age does not resemble the one at the oldest.
- The incidence of cancer in this age group increased steadily during the past quarter century.
- This increase is declining and at the older end of the age range appears to be returning to the incidence of the 1970s.
- Males in the 15- to 29- year age group have been at higher risk of developing cancer, with the risk directly proportional to age.
- Non-Hispanic whites have had the highest risk of developing cancer during this phase of life, and Asians, American Indians and Alaskan Natives the lowest.
- Males had a worse prognosis than females. African Americans/blacks, American Indian/Alaska Natives had a worse prognosis than white non-Hispanics and Asians.

Mortality & Survival

- At the beginning of the last quarter century, the diagnosis of cancer in 15- to 29-year-olds carried a more favorable prognosis, on the average, relative to cancer at other ages.
- Since then, there has been a lack of progress in survival improvement among older adolescents and young adults relative to all other ages.
- Survival improvement trends portend a worse prognosis for young adults diagnosed with cancer today than 25 years ago.
- The survival deficit is increasing with longer follow-up of the survivors, and is worse in males.
- Among 15- to 29-year-olds, non-Hispanic whites had the best survival and African Americans/blacks had the worst survival, with a 20% difference apparent by 5 years.
- Asians/Pacific Islanders had the second best survival, with Hispanics and American Indians/Alaska Natives next in sequence.

Risk Factors

- In general, there are relatively scant data to support either an environmental causation or an inherited predisposition to cancer in this age group.
- The majority of cases of cancer occurring before age 30 appear to be spontaneous and unrelated to either carcinogens in the environment or family cancer syndromes.
- Overall, family cancer syndromes appear to account for less than 5% of the cases of cancer in the age group. Melanoma, cervical carcinoma and Kaposi sarcoma, non-Hodgkin lymphoma, Hodgkin and Burkitt lymphomas accounting for the majority of environmentally induced malignancies (ultraviolet light, human papillomavirus, human immunodeficiency virus, and Epstein-Barr virus, respectively).
- Ultimately, a larger proportion of cases may be attributable to specific factors or genetic predisposition, but at present, most cancer in this age group appears to be sporadic and random.

INTRODUCTION

To our knowledge, this is the first treatise devoted exclusively to cancer in adolescents and young adults 15- to 29-years of age. A prior monograph from the Surveillance, Epidemiology and End Results (SEER) program of the National Cancer Institute (NCI) of the United States reported the epidemiology of cancer in children younger than 20 years of age.[1] For many of the analyses in the current report, data for the age groups 0 to 15 years and 30 to 44 years are included for comparison. The SEER incidence data included in this introductory chapter were collected mainly between 1975 and 2001.

As in the prior monograph, and as routinely available in the SEER database,[2] five year increments (15 to 19 years, 20 to 24 years, 25 to 29 years, etc.) are utilized in most analyses. Only recently have data from SEER become available in shorter age intervals, but with the exception of this introductory chapter, these data are not presented in this monograph. Although the pediatric cancer monograph included a chapter about 15- to 19-year-olds,[3] the current monograph contains new and more varied analyses.

Each disease-based chapter follows a standard outline, beginning with incidence and followed by death rates, survival information and risk factors/etiology, in that sequence. Each of the disease-based chapters is authored by an expert epidemiologist, at least one pediatric oncologist, and at least one academic oncologist who is an expert in the care of adult patients with cancer (medical, surgical, gynecologic, and/or radiation oncologist).

METHODS, CLASSIFICATION SYSTEM, AND DATABASES

Invasive cancer refers to any malignancy except squamous and basal cell carcinoma skin cancer, *in situ* cancers of any organ except bladder, or ovarian cancers of borderline significance. It does include juvenile pilocytic astrocytoma, a low-grade brain tumor with little metastatic potential. There are two primary site and histology groupings based on the *International Classification of Diseases for Oncology*[4,5] (ICD-O): the SEER site recode (http://www.seer.cancer.gov/siterecode/icdo3_d01272003/) and the *International Classification of Childhood Cancers* (ICCC). The ICD-O evolved as an expansion of the International Classification of Diseases (ICD) in order to code both primary site and histologic type, and has been through a number of revisions. The SEER site recode was developed mainly to group adult cancers by primary site. The ICCC was developed later[6] to better characterize pediatric cancers. The SEER site recode was based primarily on the site in the body where cancer arises (e.g. gastrointestinal tract, genitourinary system, respiratory system, and the breast). The majority of pediatric cancers are disseminated when they are diagnosed and only the tissue of origin can be determined. The SEER site recode is therefore mainly topographic and the ICCC is primarily based on histology. Further refinements have been proposed for adolescents and young adults to allow categorization of the epithelial tumors (carcinomas) that are much more common in this age group than in children.[7,8] The *Methods* chapter that follows provides more information on classification, and explains which SEER and national mortality databases were used and how the analyses were conducted.

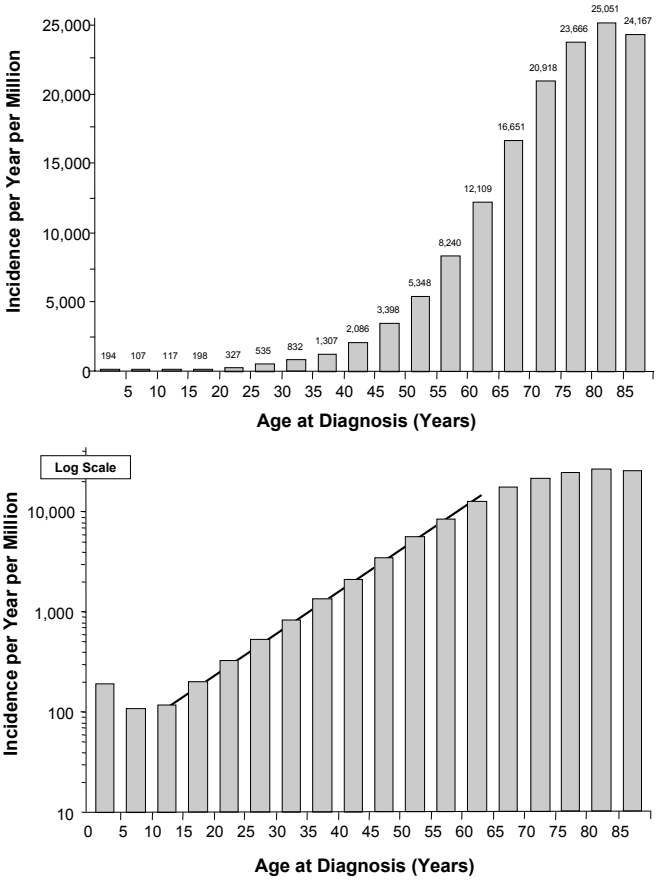

Figure 1.1: Incidence of All Invasive Cancer, SEER 1975-2000

Table 1.1: *Incidence of Invasive Cancer in Persons Younger Than 45 Years of Age*

AGE AT DIAGNOSIS (YEARS)	< 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
U.S. population, year 2000 census, in millions	19.175	20.549	20.528	20.219	18.964	19.381	20.510	22.706	22.441
Incidence of all invasive cancer per million per year, 1975-2000, SEER	206	111	125	203	352	547	833	1,289	2,094
Average annual % increase in invasive cancer, 1975-2000, SEER	1.0	0.4	0.9	0.7	1.0	1.9	1.6	1.1	0.4
Estimated incidence of invasive cancer per million, year 2000, U.S.	217	113	129	216	365	662	983	1,462	2,156
Estimated number of persons diagnosed with invasive cancer, year 2000, U.S.	4,153	2,314	2,638	4,374	6,928	12,830	20,162	33,197	48,385

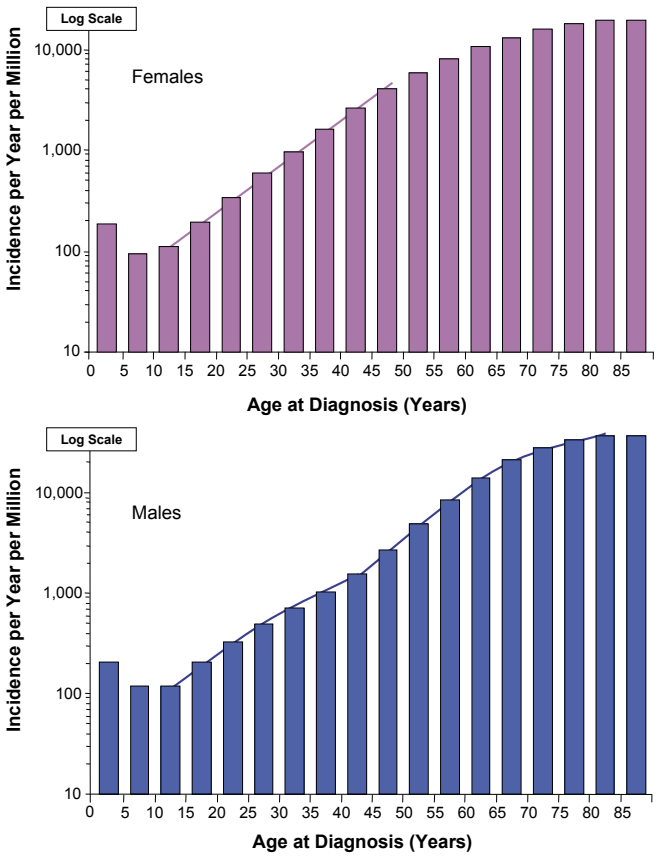

Figure 1.2: Incidence of All Invasive Cancer, SEER 1975-2000

INCIDENCE

In the U.S., as in most economically advantaged countries of the world, 2% of all invasive cancer occurs in the 15-year interval between the ages of 15 and 30 years. This compares with cancer diagnosed before age 15, which accounts for 0.75% of all cancers. There are 2.7 times more patients diagnosed during the second 15 years of life than during the first 15 years. At the turn of the millennium—in the year 2000—nearly 21,400 persons in the United State 15 to 29 years of age were diagnosed with invasive cancer (Table 1.1). Because the incidence of cancer increases exponentially as a function of age (Figure 1.1), approximately half of the 15- to 29-year-old patients are 25 to 29 years of age.

Age-Specific Incidence

Figure 1.1 shows the incidence of all invasive cancer in the U.S. from 1975 to 2000 as a function of 5-year age intervals from birth to 85+ years. The upper panel displays a linear ordinate and the lower panel uses semi-logarithmic coordinates. The straight line in the lower panel indicates that the incidence is exponentially correlated with age from 10 to 60 years. That adolescents and young adults have an exponential risk of developing cancer as they age suggests a biologic mechanism that is age-dependent, such as telomerase shortening or a mutation-to-malignancy rate that increases constantly with age, and that most cancer before age 30 is not due to environmental carcinogens.

Gender-Specific Incidence

Figure 1.2 shows the corresponding incidence in females (upper panel) and males (lower panel), each expressed on semi-logarithmic coordinates. Females demonstrate the exponential risk pattern from age 10 to 50 years. Males instead have 2 exponential risk patterns, from 10 to 40 years and 40 to 80 years. This suggests that another age-dependent mechanism is operative in young adult males. This pattern may be attributable also to the cancers that occurred in males during the 1980s and early 1990s as a result of the human immunodeficiency virus, namely Kaposi sarcoma and HIV-related lymphoma.

Figure 1.3 demonstrates how dependent on age is the relative risk of being diagnosed with cancer in males versus females. The male:female ratio has a nadir at 40 to 44, years, during which females are almost twice as likely as males to be diagnosed with invasive cancer. At both ends of the age spectrum—in children and older adults—the ratio is reversed. Boys are 10–25% more likely than girls to be diagnosed with cancer, and older adult males are much more likely to develop cancer than females. The transition from a male predominance in childhood to a female predominance in the middle years of life occurs during late adolescence/early adulthood. The male:female ratio declines linearly from the 10- to 14-year age group to the 40- to 44-year age group.

Racial/Ethnic Differences in Incidence

The dependence of cancer incidence on race and ethnicity as a function of age is shown in Figure 1.4 for all ages in 15 year-intervals up to age 44, and as one group for older persons. In Figure 1.5, it is shown for 5-year age intervals up to age 45. Non-Hispanic whites had the highest incidence during the first 40 years of life. Over age 40, African Americans/blacks had the highest incidence, followed by white non-Hispanics and Americans of Hispanic/Latino, Asian, and Pacific Islander descent. American Indians/Alaska Natives had the lowest cancer incidence at all ages. Males and females follow similar race/ethnicity-incidence patterns to those described above up to age 40 (Figure 1.6). The conversion to a higher incidence in African Americans/blacks occurs in males between age 40 and 44 and in females at an older age (Figures 1.4 and 1.6).

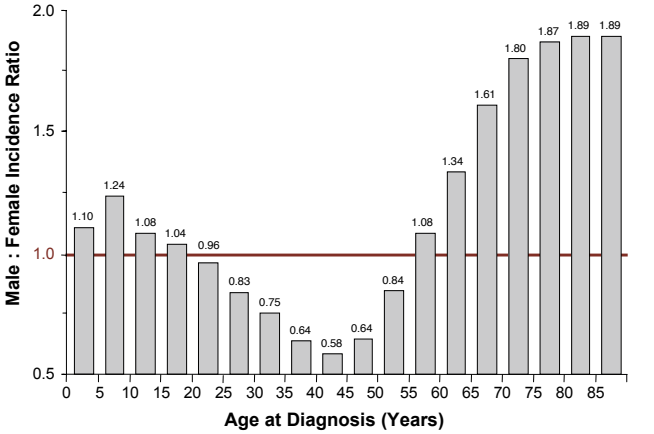

Figure 1.3: Incidence of All Invasive Cancer, Male:Female Ratio, SEER 1975-2000

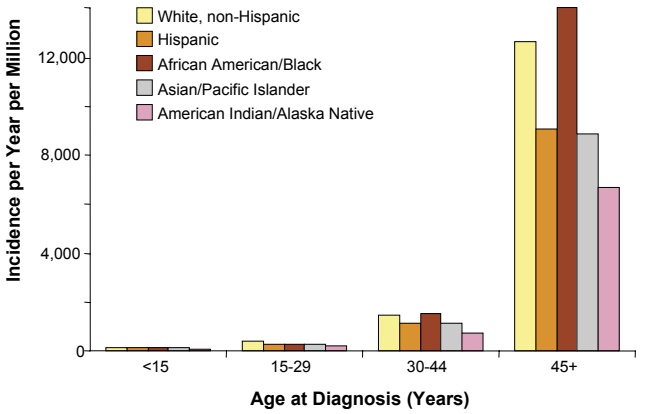

Figure 1.4: Incidence of All Invasive Cancer by Race/Ethnicity, SEER 1990-1999

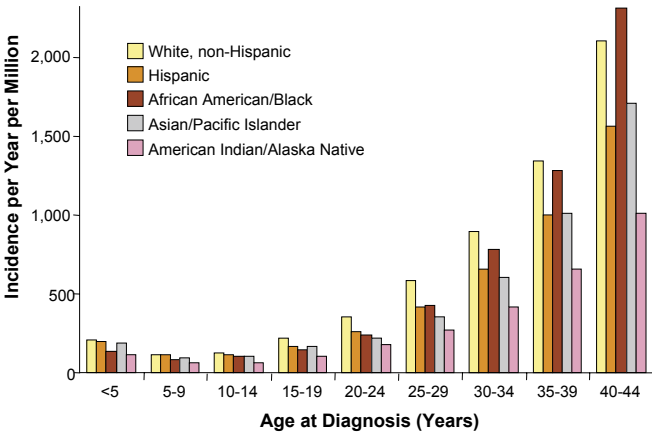

Figure 1.5: Incidence of All Invasive Cancer by Race/Ethnicity, SEER 1990-1999

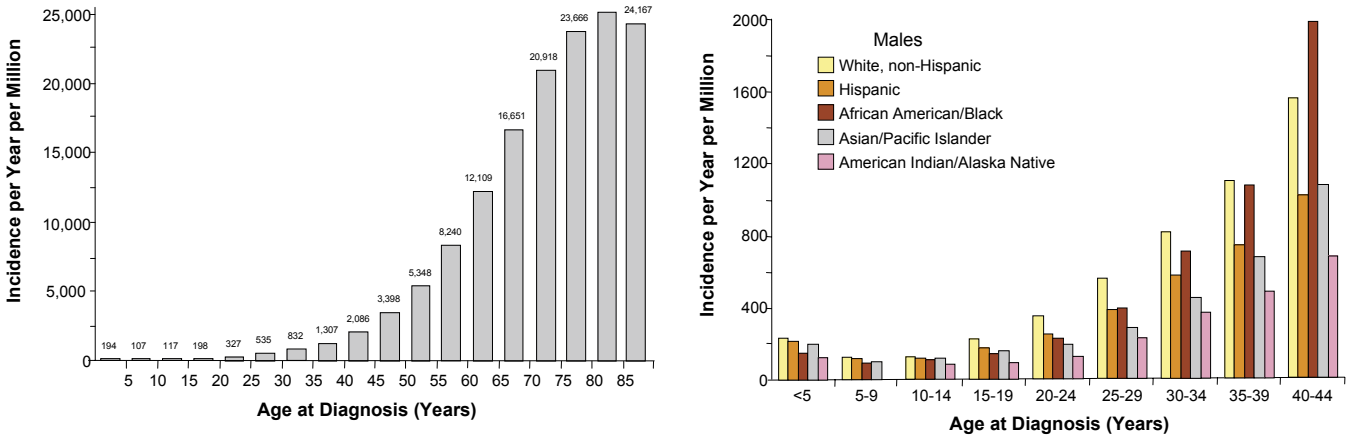

Figure 1.6: Incidence of All Invasive Cancer by Race/Ethnicity, SEER 1990-1999

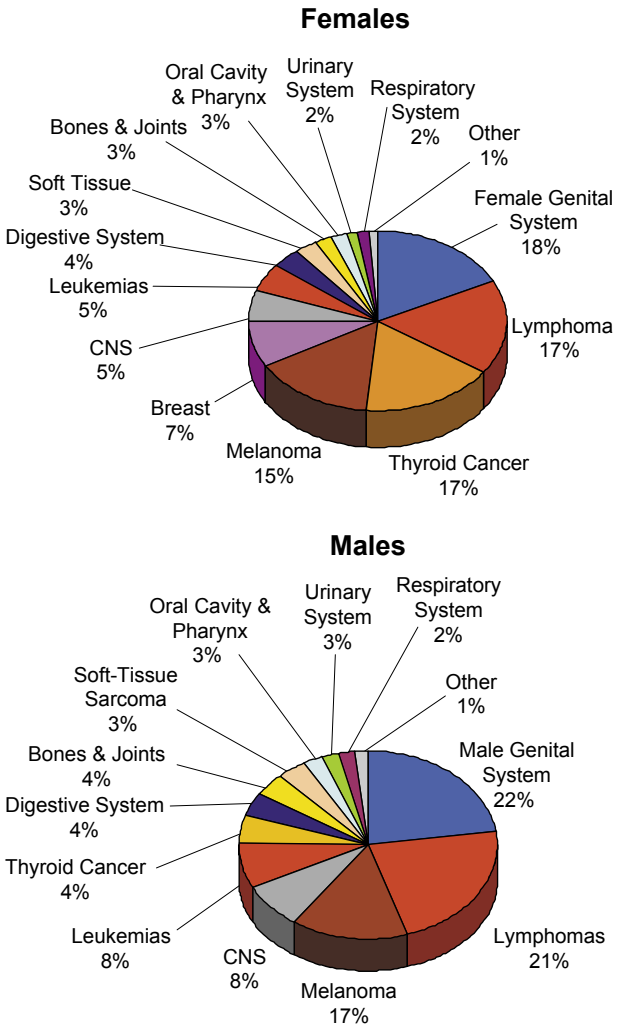

Figure 1.7: Cancer in 15- to 29-Year-Olds by Primary Site (SEER Site Recode) U.S., SEER 1975-2000

Types of Cancer

The common types of cancer and their relative proportion of all invasive cancers that occurred in 60,824 15- to 29-year-old Americans registered by SEER from 1975 to 2000 are shown in the pie diagram on the first page of this chapter, according to the SEER site recode. Lymphoma accounted for the largest proportion, 20% of all cases, with Hodgkin lymphoma alone accounting for 12% of all cases. Next in frequency were invasive skin cancer (15%) and male genital system cancer (11%), followed in rank order by endocrine system cancer (11%), female genital tract malignancies (9%—predominantly of the uterine cervix and ovary), brain and spinal cord tumors (6%), leukemias (6%), breast cancer (5%), digestive tract malignancies (4%—predominantly of liver and colon), soft-tissue sarcomas (3%), bone sarcomas (3%—predominantly osteosarcoma and Ewing sarcoma), cancers of the oral cavity/pharynx, urinary tract, and respiratory system (each 2%), and other, including extragonadal germ cell tumors such as teratocarcinoma and dysgerminoma (1%).

The distribution of the most frequent cancers in the U.S. among 15- to 29-year-olds according to gender is shown in Figure 1.7. The most striking difference between males and females in the 15- to 29-year age range is the much higher frequency of thyroid cancer in females. In both males and females, malignancies of the genital tract are the most frequent type of cancer followed closely by lymphomas (and thyroid for females).

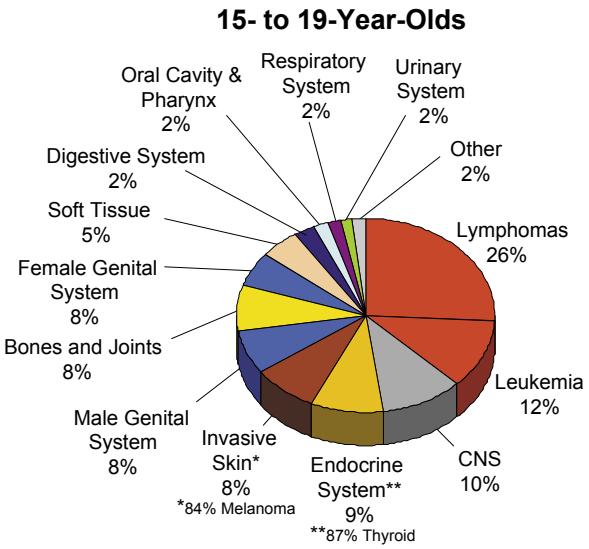

Figure 1.8: Cancer in 15- to 19-Year-Olds by Primary Site (SEER Site Recode) U.S., SEER 1975-2000

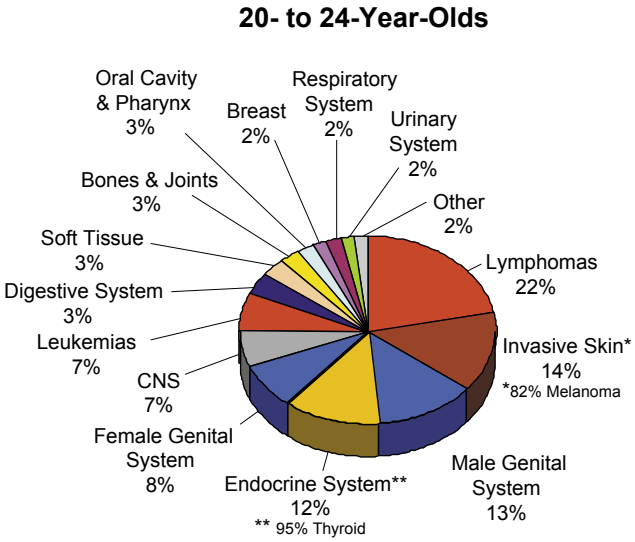

Figure 1.9: Cancer in 20- to 24-Year-Olds by Primary Site (SEER Site Recode) U.S., SEER 1975-2000

The distribution of the most frequent cancers by 5-year age intervals within the 15- to 29-year age range is shown in Figures 1.8, 1.9, and 1.10. The most dramatic changes in the types of cancer as a function of age (15 to 29 years) occurred in melanoma (from 5th most frequent in the 15- to 19-year age group to 1st most frequent in the 25- to 29-year age group, when gender is not considered), leukemia (from 2nd most frequent to 9th), and CNS tumors (3rd to 7th).

Trends in Incidence

Between 1975 and 2000, cancer increased in incidence for all age groups younger than 45 years (Figure 1.11). Between 25 and 45 years of age, most of the increase in overall cancer incidence occurred in males (Figure 1.12). Those cancers with the greatest change in incidence during this interval are shown in Figures 1.13 and 1.14.

The increase in incidence among 25- to 39 -year-old males (Figure 1.12) was due in large part to increases in soft tissue sarcoma (notably Kaposi sarcoma), non-Hodgkin lymphoma, and testicular carcinoma (Figure 1.13). Among females younger than 45 years of age, the greatest increase occurred in germ cell tumors (Figure 1.14).

There is evidence that the increase in incidence has declined for 15- to 29-year-olds, with a leveling off of

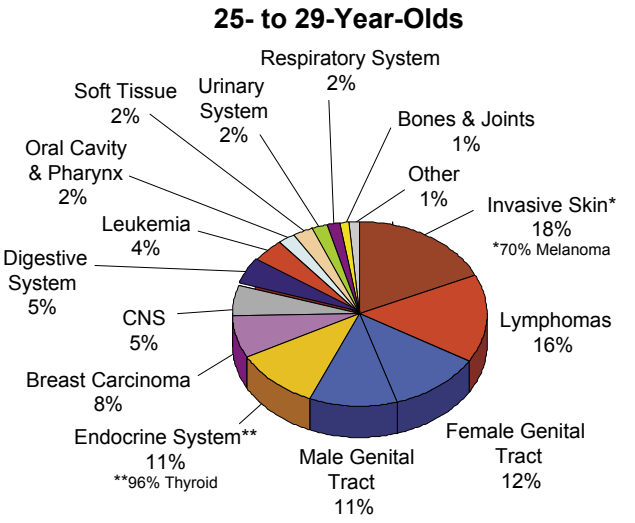

Figure 1.10: Cancer in 25- to 29-Year-Olds by Primary Site (SEER Site Recode) U.S., SEER 1975-2000

incidence among 15- to 24-year-olds and a decrease in 25- to 29-year-olds (after a peak in the late 1980s and early 1990s) (Figure 1.15). That sarcoma and lymphoma accounted for most of the increase in cancer in males between 25 and 40 years of age (Figure 1.13) suggests that the peak in incidence in this age group was primarily due to Kaposi sarcoma and non-Hodgkin lymphoma as a result of the human immunodeficiency virus epidemic.

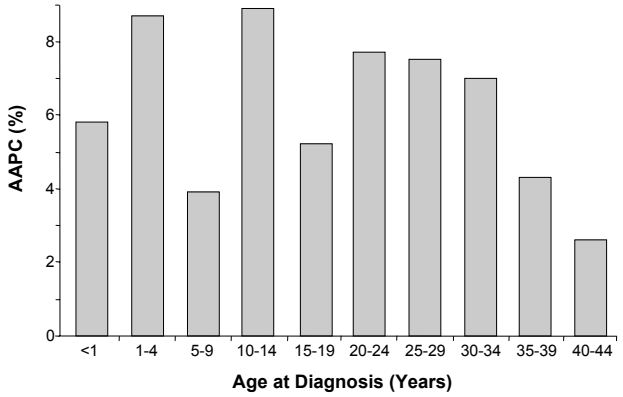

Figure 1.11: Average Annual Percent Change (AAPC) in Incidence of All Invasive Cancers, SEER 1975-2001

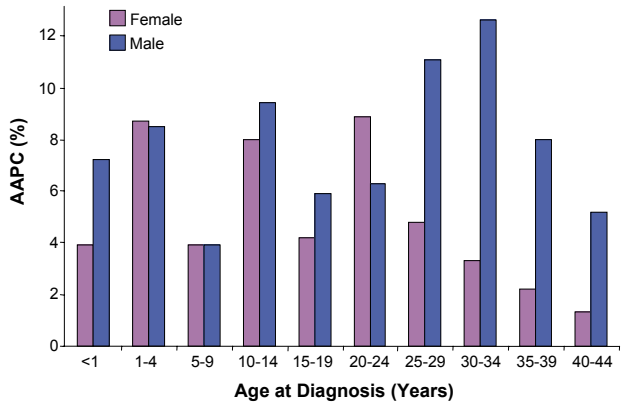

Figure 1.12: Average Annual Percent Change (AAPC) in Incidence of All Invasive Cancer by Gender, SEER 1975-2001

OUTCOME

Age- and Gender-Specific Mortality

National mortality of all invasive cancer as a function of age at death is shown in Figure 1.16. By and large, the age-dependent cancer death rate reflects the incidence profile (Figure 1.1). More males than females die of cancer over age 45 (Figure 1.16; inset). From 30 to 44 years of age, deaths among females predominate. In patients younger than 30 years, mortality is higher in males (Figure 1.16).

Because mortality varies with incidence—the more patients diagnosed with cancer the higher the death rate would be expected to be—the gender-specific ratio of the death rate to incidence for the era 1975 to 2000 is shown in Figure 1.17. Among all age groups—from 10 to 45 years of age—more males than females have died of cancer when the death rate is considered relative to the variation in incidence. This suggests that the cancers that occurred in adolescent and young adult males during the period 1975 to 2000 were more lethal than those in women or that the treatment was less effective.

Racial/Ethnic Differences in Mortality

Figures 1.18 and 1.19 present mortality data for all invasive cancer according to ethnicity and age of death up to 45 years. The death rate generally reflects incidence (Figures 1.4 and 1.5), with the exception of 15- to 44-year-old African Americans/blacks, who had a higher death rate relative to their incidence than any of the other races/ethnicities.

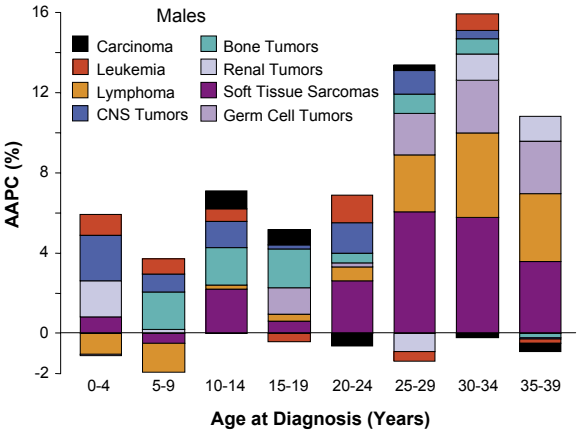

Figure 1.13: Average Annual Percent Change (AAPC) in Cancer Incidence in Males, SEER 1975-1998

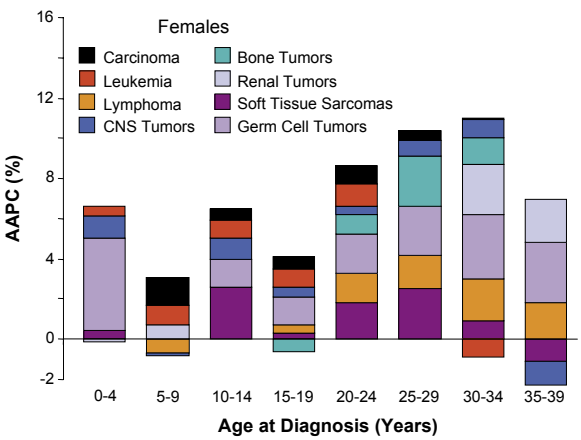

Figure 1.14: Average Annual Percent Change (AAPC) in Cancer Incidence in Females, SEER 1975-1998

Trends in Mortality

Mortality from invasive cancer declined between 1975 and 2000 in all age groups younger than age 45, but the least improvement occurred in 20- to 44-year-olds (Figure 1.20). This pattern—less progress in reducing cancer mortality for young adults than for children and young adolescents—is true for males and females (Figure 1.21) and for white non-Hispanics and African Americans/blacks (Figure 1.22). Among African Americans/blacks, however, the rate of progress in reducing mortality was considerably lower, particularly in 15- to 24-year olds (Figure 1.22).

Survival

Survival up to 20 years after a diagnosis of invasive cancer is shown in Figure 1.23 for all patients followed by SEER from 1975 to 1999, and in Figures 1.24 and 1.25 for females and males, respectively, during this era. Among both female and male 15- to 29-year-olds, survival after an invasive cancer diagnosis was comparable to that in persons who were younger than age 15 when diagnosed. In males older than 30, survival was worse. Above age 45, survival was considerably worse than for younger age groups, and comparable in men and women.

Survival as a function of race/ethnicity among < 15, 15- to 29-, 30- to 44-, and 45+ year-olds with cancer in the period 1992 to 1999 is shown in Figure 1.26. The era is more recent and the follow-up shorter because race/ethnicity data for other than whites and African Americans/blacks were not available until the 1990 census. Among 15- to 29-year-olds, non-Hispanic whites had the best survival and African Americans/blacks had the worst survival, with a 20% difference apparent by 5 years. Hispanics, Asians/Pacific Islanders and American Indians/Alaska Natives had an intermediate survival. American Indians/Alaska Natives had a more rapid cancer death rate during the first two year than non-Hispanic whites, Hispanics and Asians/Pacific Islanders, and then reached a relative plateau not seen in the other races/ethnicities. During the 1990s, 27% of American Indians/Alaska Natives with cancer died within two years, more than twice the death rate observed among non-Hispanic whites.

When compared to younger and older cancer patients, 15- to 29-year-olds had an intermediate survival for each

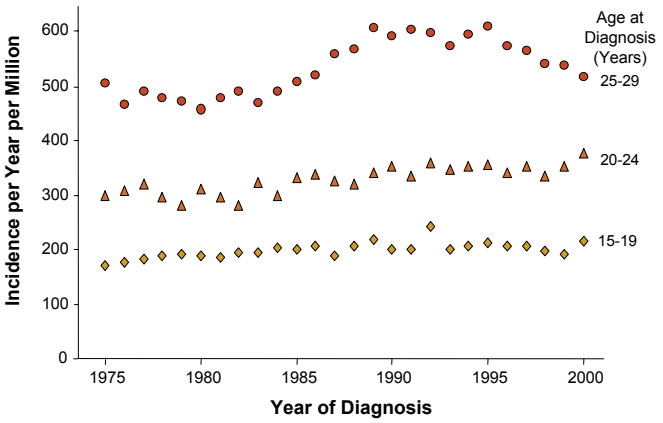

Figure 1.15: Incidence of Invasive Cancer by Year of Diagnosis, SEER 1975-2000

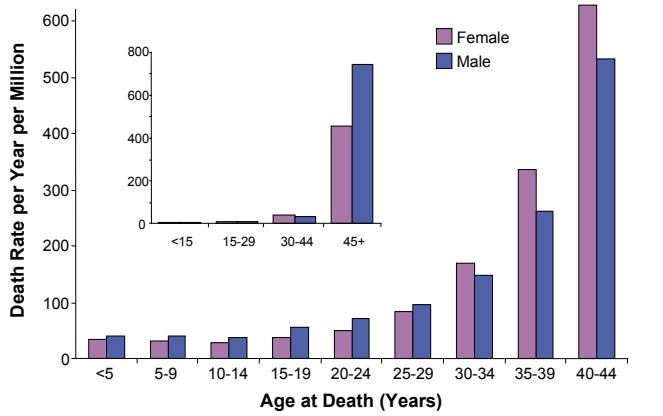

Figure 1.16: National Mortality by Gender for All Invasive Cancer, 1975-2000

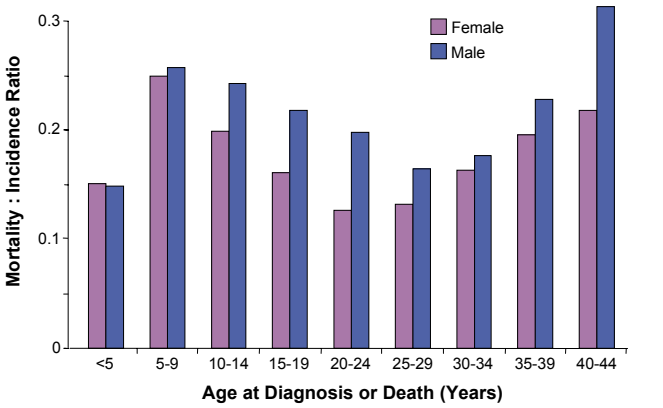

Figure 1.17: Ratio of National Mortality to SEER Incidence, All Invasive Cancer by Gender 1975-2000

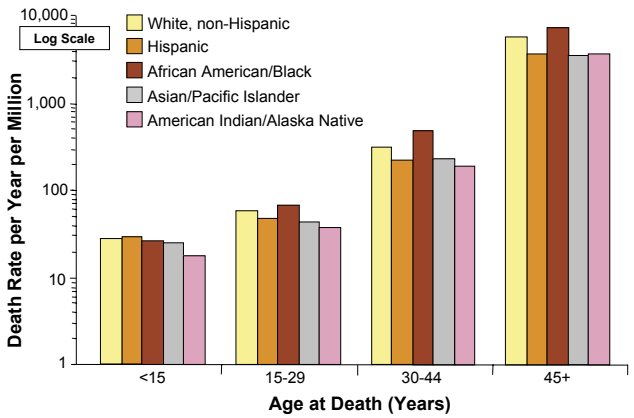

Figure 1.18: National Mortality by Race/Ethnicity for All Invasive Cancer, U.S., 1990-2000

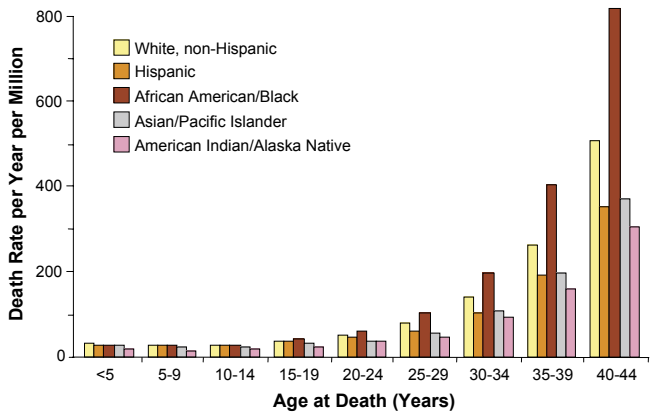

Figure 1.19: National Mortality by Race/Ethnicity for All Invasive Cancer, U.S., 1990-2000

of the races/ethnicities (Figure 1.26). The higher cancer death rate in African Americans/blacks observed in older adults is equally apparent in 15- to 29-year-olds but not in < 15-year-olds, in whom the worst initial survival occurred in American Indians/Alaska Natives and the ultimate survival appeared similar for races/ethnicities other than non-Hispanic whites (Figure 1.26). Also, in 30- to 44-year-olds the plateau on the survival curve in 15- to 29-year-old American Indians/Alaska Natives was not observed. And in comparison to both < 15- and 15- to 29-year age groups, the survival curves among 30-to 44-year-olds clearly separated, with the order of best-to-worst survival being non-Hispanic whites, Asians/Pacific Islanders, Hispanics, American Indians/Alaska Natives, and African Americans/blacks.

Figure 1.27 depicts the 5-year survival rate of 15- to 29-year-olds diagnosed with cancer during 1975 to 1997 by year of diagnosis. Little improvement in survival is noted during the 23 years of SEER tracking.

Figures 1.28 and 1.29 display the average annual percent change in 5-year relative survival of patients diagnosed between 1975 and 1997, inclusive, as a function of age at diagnosis, in 5-year age increments (see Chapter 2, *Methods*, for an explanation of how SEER derives this parameter). Relative survival refers to adjustment of the observed survival relative to the survival expected from population norms of the same age, and thereby partially corrects for deaths due to causes other than cancer (ibid).

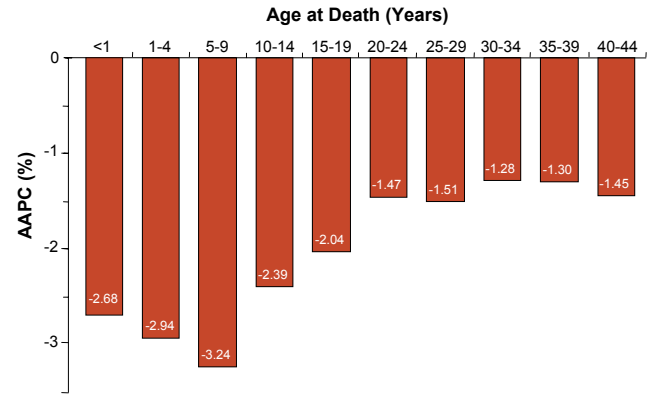

Figure 1.20: Average Annual Percent Change (AAPC) in National Mortality for All Invasive Cancer, U.S., 1975-2000

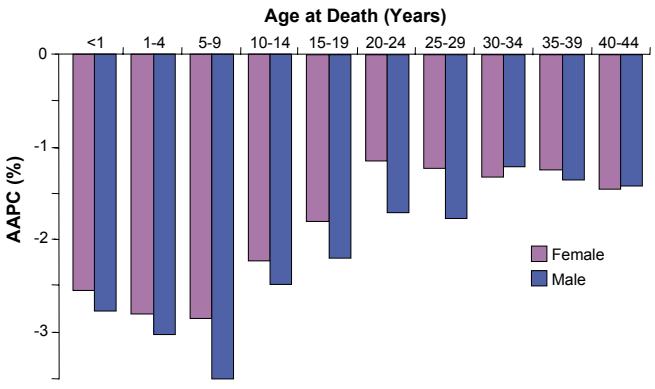

Figure 1.21: Average Annual Percent Change (AAPC) in National Mortality for All Invasive Cancer by Gender, U.S., 1975-2000

Steady progress in improving the 5-year survival rate has occurred in children and older adults. For patients between 15 and 45 years of age, however, progress in survival improvement has been a fraction of that achieved in younger and older patients. For patients between 25 and 35 years of age, in fact, there has been no evidence for an improvement in survival (Figure 1.28). Most of the older adolescent/young adult deficit occurred in males, but females have not been spared (Figure 1.29). Among females, the least amount of improvement occured in 25- to 29-year-olds; among males it was in 25- to 39-year-olds.

To determine whether the young adult survival gap was apparent at follow-up time points other than every five years, the 1- and 5-year relative survival rates were compared. In this analysis, individual year-to-year age groups were evaluated instead of 5-year age groupings, and the survival rates during the 1995 to 1999 era were compared with the 1975 to 1999 era rates and expressed as the percentage improvement since the earlier era. Both survival parameters (1- and 5-year survival rates) showed the same profile (Figure 1.30), with a nadir in progress between age 25 and 40 years (the vertical red band in the Figure). The 5-year survival pattern showed a greater disparity than the pattern at 1-year, indicating that the survival deficit gap increased with longer follow-up of the patients. As in the analyses that utilized the average percent change method, young adult males had a more striking deficit than females in the same age group (Figure 1.31).

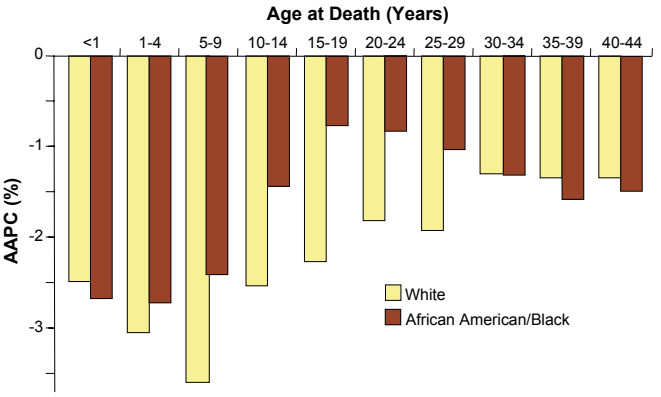

Figure 1.22: Average Annual Percent Change (AAPC) in National Mortality for All Invasive Cancer by Race, U.S., 1975-2000

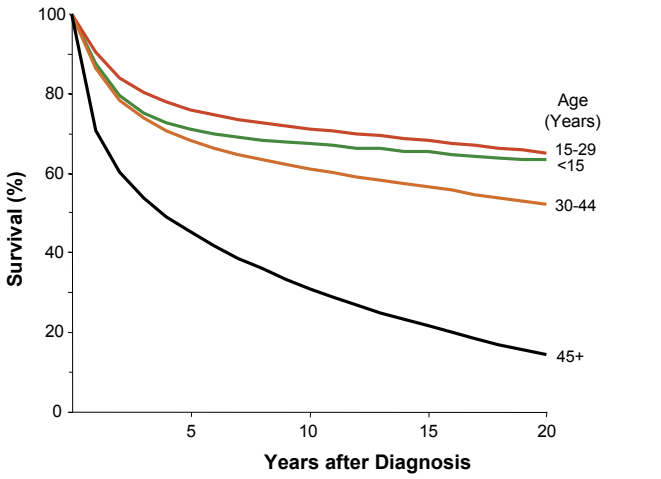

Figure 1.23: Relative Survival for All Invasive Cancer by Age, SEER 1975-1999

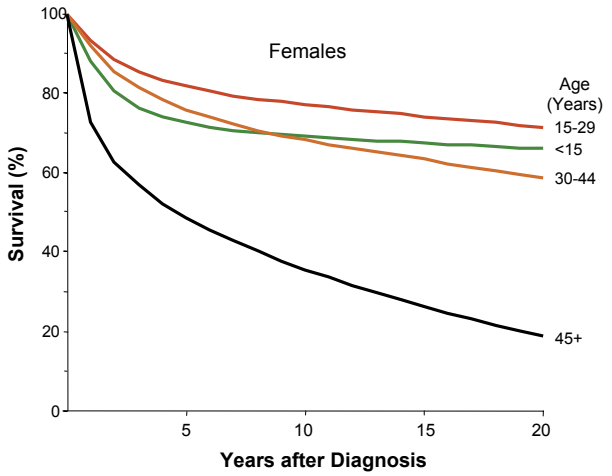

Figure 1.24: Relative Survival for All Invasive Cancer in Females by Age, SEER 1975-1999

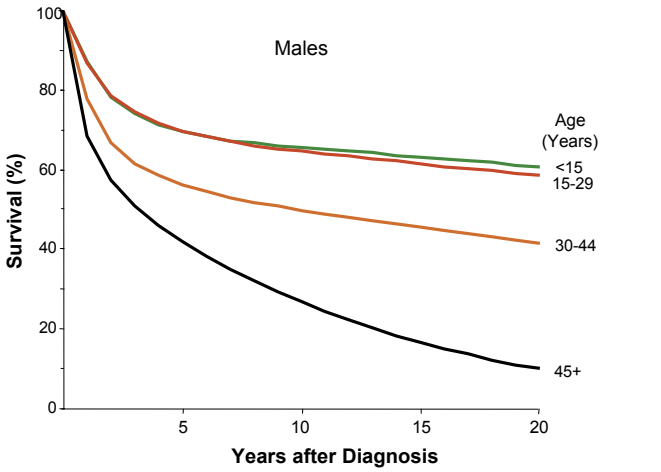

Figure 1.25: Relative Survival for All Invasive Cancer in Males by Age, SEER 1975-1999

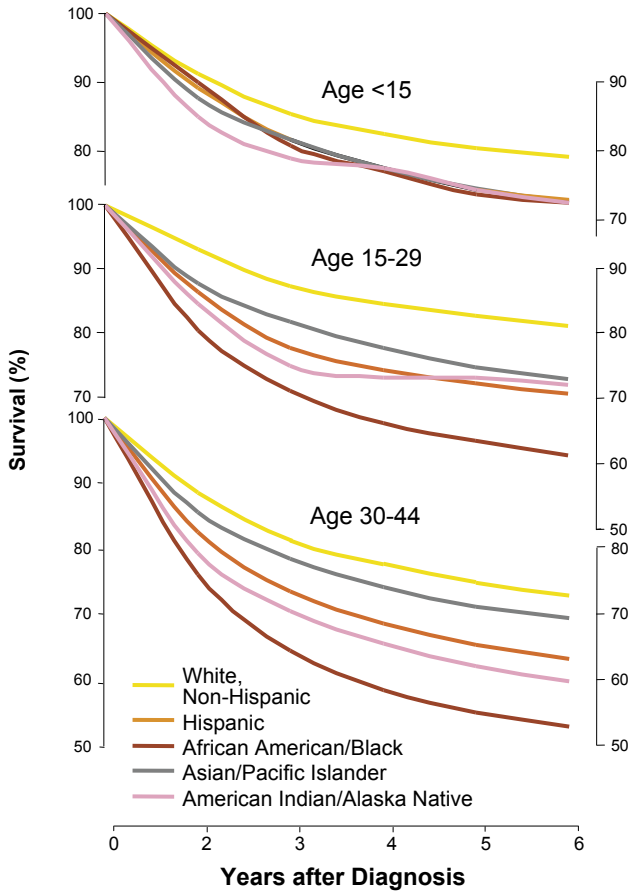

Figure 1.26: Relative Survival for All Invasive Cancer by Race/Ethnicity, SEER 1992-1999

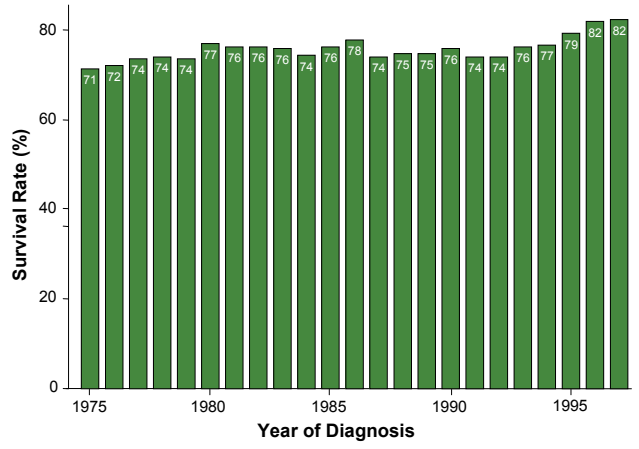

Figure 1.27: 5-Year Relative Survival, Age 15-29, SEER 1975-1997

RISK FACTORS

Etiologic mechanisms and risk factors of the most common cancers that occur in the 15- to 29-year age group are considered in the disease-specific chapters. In general, there are relatively scant data to support either an environmental causation or an inherited predisposition to cancer in this age group. The vast majority of cases of cancer diagnosed before age 30 appear to be spontaneous and unrelated to either carcinogens in the environment or family cancer syndromes. There are exceptions, covered in each disease chapter, but the exceptions are rare. Clear cell adenocarcinoma of the vagina or cervix in adolescent females has in most cases been caused by diethylstilbestrol taken prenatally by their mothers in an attempt to prevent spontaneous abortion. Radiation-induced cancer may occur in adolescents and young adults after exposure during early childhood. In fact, many of the adolescent and young adult cancers that have been linked to an identifiable cause are second malignant neoplasms in patients who were treated with chemotherapy and/or radiotherapy for a prior cancer. Melanoma, cervical carcinoma, Kaposi sarcoma and non-Hodgkin lymphoma, and Hodgkin and Burkitt lymphomas account for the majority of environmentally induced malignancies (due to ultraviolet light, human papillomavirus, human immunodeficiency virus, and Epstein-Barr virus, respectively). Ultimately, a larger proportion of cases may be attributable to specific factors or genomic predisposition but, at present, most cancers in this age group appear to be sporadic and random. Overall, family cancer syndromes appear to account for less than 5% of the cases of cancer in the 15- to 29-year age group.

SUMMARY

A cancer diagnosis between the ages of 15 and 30 years is 2.7 times more common than such a diagnosis during the first 15 years of life, and yet is rare—accounting for just 2% of all invasive cancers—relative to cancer occurring at older ages. Malignant disease in persons 15 to 29 years of age is unique in the distribution of types that occur, with Hodgkin lymphoma, melanoma, testis cancer, female genital tract malignancies, thyroid cancer, soft-tissue sarcomas, non-Hodgkin lymphoma, leukemia, brain and spinal cord tumors, breast cancer, bone sarcomas, and non-gonadal germ cell tumors accounting for 95% of the cancers in this

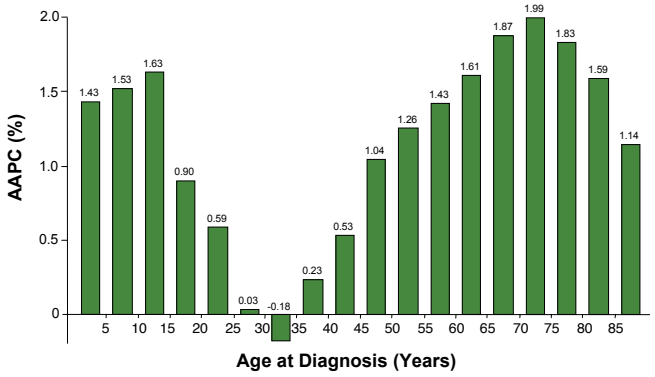

Figure 1.28: Average Annual Percent Change (AAPC) in 5-Year Relative Survival for All Invasive Cancer, SEER 1975-1997

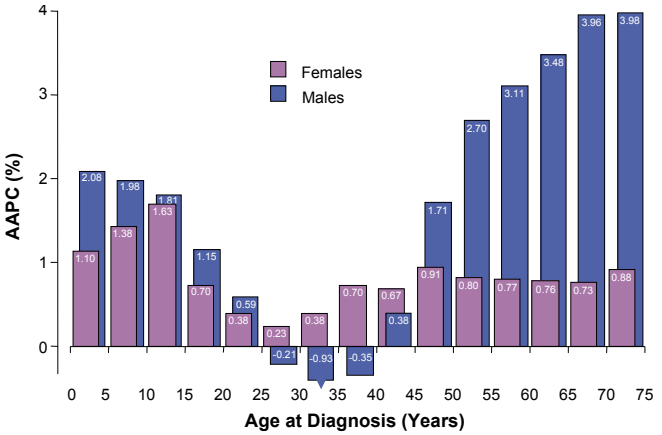

Figure 1.29: Average Annual % Change (AAPC) in 5-Year Relative Survival for All Invasive Cancer by Gender, SEER 1975-1997

age group. In the brief period from 15 to 30 years of age, the frequency distribution of cancer types changes dramatically, such that the pattern at age 15 does not resemble that at age 30.

A failure to improve length of survival and reduce mortality has occurred in this age group relative to other age groups. Fortunately, the incidence increase observed during the past quarter century is declining, and for those at the older end of the age range appears to be returning to the incidence of the 1970s.

Males in the 15- to 29-year age group have been at higher risk of developing cancer, with the risk directly proportional to age. White non-Hispanics have had the highest risk of developing cancer during this phase of life, and Asians/Pacific Islanders, American Indians and Alaska Natives the lowest. Males have had a worse prognosis, as have African Americans/blacks, American Indians, and Alaska Natives among the races/ethnicities evaluated.

The most disturbing finding is the lack of progress in survival improvement among older adolescents and young adults in contrast to all other ages. Whereas the diagnosis of cancer in this age group used to carry a more favorable prognosis relative to cancer at other ages, current survival improvement trends portend a worse prognosis for today's young adults diagnosed with cancer.

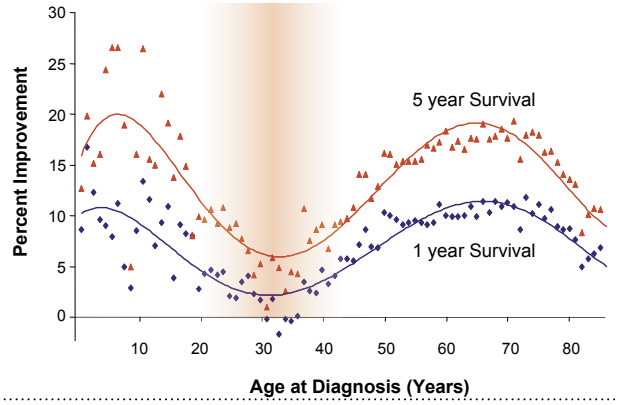

Figure 1.30: Change in Relative Survival Proportion, 1995-1999 versus 1975-1979, for All Invasive Cancer, SEER

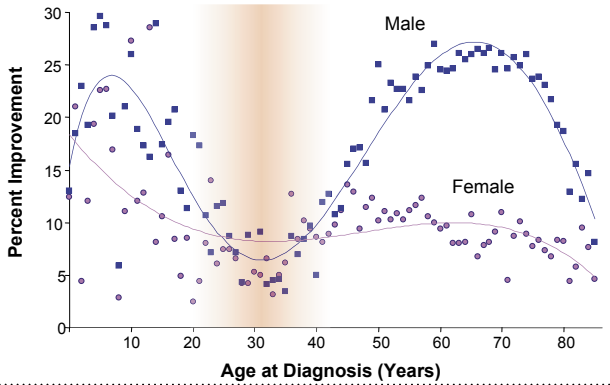

Figure 1. 31: Change in Relative 5-Year Survival Proportion, 1995-1999 versus 1975-1979, for All Invasive Cancer by Gender, SEER

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