Cancer Treatment and Survivorship Statistics, 2014

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The number of cancer survivors continues to increase due to the aging and growth of the population and improvements in early detection and treatment. In order for the public health community to better serve these survivors, the American Cancer Society and the National Cancer Institute collaborated to estimate the number of current and future cancer survivors using data from the Surveillance, Epidemiology, and End Results (SEER) program registries. In addition, current treatment patterns for the most common cancer types are described based on information in the National Cancer Data Base and the SEER and SEER-Medicare linked databases; treatment-related side effects are also briefly described. Nearly 14.5 million Americans with a history of cancer were alive on January 1, 2014; by January 1, 2024, that number will increase to nearly 19 million. The 3 most common prevalent cancers among males are prostate cancer (43%), colorectal cancer (9%), and melanoma (8%), and those among females are cancers of the breast (41%), uterine corpus (8%), and colon and rectum (8%). The age distribution of survivors varies substantially by cancer type. For example, the majority of prostate cancer survivors (62%) are aged 70 years or older, whereas less than one-third (32%) of melanoma survivors are in this older age group. It is important for clinicians to understand the unique medical and psychosocial needs of cancer survivors and to proactively assess and manage these issues. There are a growing number of resources that can assist patients, caregivers, and health care providers in navigating the various phases of cancer survivorship.

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Introduction

Although the overall age-adjusted cancer incidence rate has declined over the past 10 years,1 the number of cancer survivors continues to grow in the United States. This reflects increases in the number of new cancer diagnoses due to a growing and aging population and improved survival as a result of earlier detection and treatment advances.

There are several definitions of cancer survivors; in this article, we use the term “cancer survivor” to describe any person who has been diagnosed with cancer. This includes patients currently fighting cancer and those who may have become cancer free. Many survivors must cope with long-term effects of treatment as well as psychological concerns such as fear of recurrence.2 Throughout this article, the terms “patient with cancer” and “survivor” are used interchangeably. It is important to note that not all individuals with a history of cancer identify with the term “cancer survivor.”

In this article, we provide statistics on cancer prevalence, treatment patterns, and survival and review issues related to survivorship for some of the most common cancers among survivors in the United States.

Materials and Methods

Prevalence Estimates

Cancer prevalence was projected using the Prevalence, Incidence Approach Model, which calculates prevalence from cancer incidence and survival and all-cause mortality.3 Incidence and survival were modeled by cancer type, patient sex, and age group using malignant cases diagnosed from 1975 through 2007 from the 9 oldest registries in the Surveillance, Epidemiology, and End Results (SEER) program (2010 submission data). Survival was assumed to be constant from 2007 through

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2024 and was estimated by fitting a parametric mixture cure survival model to the SEER incidence data. Mortality data for 1969 through 2008 were obtained from the National Center for Health Statistics and projected mortality rates for 2009 to 2024 were obtained from the Berkeley Mortality Database cohort life tables (demog.berkeley.edu/~bmd/). Population projections from 2008 through 2024 were obtained from the US Census Bureau. For each site and sex combination, an adjustment was made to align the projected prevalence with more directly estimated prevalence in 2009. For more information about this method, see the studies by Mariotto et al. Estimated numbers of survivors by age at prevalence for breast cancer, prostate cancer, colorectal cancer, and melanoma were calculated by applying the age-distribution of cancer survivors published by Howlader et al to the 2014 prevalence estimates.

2014 Case Estimates

The method for estimating the number of new US cancer cases in 2014 is described elsewhere. Briefly, the total number of cases in each state is estimated using a spatio-temporal model based on incidence data from 49 states and the District of Columbia for the years 1995 through 2010 that met the North American Association of Central Cancer Registries’ high-quality data standard for incidence. The number of new cases nationally and in each state is then projected 4 years ahead using a temporal projection method. This method considers geographic variations in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors as predictors of incidence, and also accounts for expected delays in case reporting.

Stage at Diagnosis

A number of different staging systems are used to classify cancers. The TNM staging system, such as that used in the American Joint Committee on Cancer staging system, uses information on the size and extension of the tumor (T), regional lymph node involvement (N), and the presence of distant metastases (M), sometimes along with other information, to determine the stage of disease. Most cancers are given stages indicated by the Roman numerals I through IV. Stage 0 is used for some cancers to indicate in situ disease. The TNM staging system is commonly used in clinical settings and is used in this article for the description of treatment patterns. Summary Stage, a less complex staging system, has historically been used by central cancer registries and allows for comparison of stage at diagnosis over time. Cancers are classified as in situ, local, regional, and distant based on the extent of spread. Summary Stage is used in this article to describe population-based patterns of stage at diagnosis and survival.

Survival

This article describes survival in terms of relative survival rates. Relative survival adjusts for normal life expectancy by comparing survival among patients with cancer with that of the general population controlling for age, race, and sex. The 5-year survival statistics presented in this publication were originally published by Howlader et al and are for diagnosis years 2003 through 2009, with all patients followed through 2010. In addition, 1-year, 10-year, and 15-year relative survival rates are presented for selected cancer sites. These statistics were generated using the National Cancer Institute (NCI)’s SEER 18 database and SEER*Stat software (version 8.1.2). One-year survival rates are based on cancer patients diagnosed from 2006 and 2009, 10-year survival rates are based on diagnoses from 1997 and 2009, and 15-year survival rates are based on diagnoses from 1992 and 2009; all patients were followed through 2010. Data from the 9 oldest SEER registries are used to describe changes in survival over time.

Treatment

We analyzed cancer treatment data from 3 sources: the National Cancer Data Base (NCDB), the SEER-Medicare linked database, and the SEER*Stat database.

National Cancer Data Base

The NCDB is a hospital-based cancer registry jointly sponsored by the American Cancer Society and the American College of Surgeons, and includes approximately 70% of all malignant cancers in the United States from more than 1400 facilities accredited by the American College of Surgeons Commission on Cancer (CoC). NCDB treatment data were analyzed for 2011 except for cancer of the testis. Aggregated data for 2007 to 2011 were used to describe treatment patterns for seminomatous and nonseminomatous testicular germ cell tumors (TGCTs) because there are fewer cases for these specific sites.

The NCDB is a hospital-based registry, thus the data are not population-based and may not be representative of all patients with cancer treated in the United States. Further, data are collected for patients diagnosed or treated at CoC-accredited facilities, which are more likely to be located in larger and more urban areas compared to non-CoC-accredited facilities. In addition, cancers that are commonly diagnosed and treated in nonhospital settings (eg, melanoma, prostate cancer, and non–muscle-invasive bladder cancer) are less likely to be captured by the NCDB.

Despite these limitations, studies have shown that disease severity and treatment patterns by clinical and sociodemographic factors for common cancer sites are remarkably similar to those found in population-based SEER registries. For example, rates of chemotherapy receipt among patients aged 65 years and older with breast cancer in the
NCDB are similar to those in a published SEER-Medicare study.\textsuperscript{14,15} It is also important to note that in the 2011 NCDB data release, many common targeted therapy drugs are classified as chemotherapy. For this report, we also include drugs classified as immunotherapy in the chemotherapy category. Chemotherapy does not include hormone therapy. For more information regarding the classification of anticancer drugs into the categories of chemotherapy, immunotherapy, hormonal therapy, and targeted therapy, see the SEER-Rx Web site (seer.cancer.gov/tools/seerrx). Our analysis of treatment patterns does not include diagnostic procedures. Methods of drug delivery are not available in the NCDB. More information on the NCDB can be found at their Web site (facs.org/cancer/ncdb).

SEER-Medicare database
The SEER-Medicare linked database is a large, integrated, population-based cancer registry and claims data set that was used to access information unavailable in the NCDB, such as the use of specific chemotherapeutic agents.\textsuperscript{16} The SEER program collects clinical, demographic, and cause-of-death information for individuals with cancer from 18 registries, capturing approximately 28% of the US population. Medicare is the primary health insurer for 97% of the US population aged 65 years and older. Medicare data include inpatient, outpatient, physician services, home health, durable medical equipment, and prescription drug claims files. The linkage of these 2 data sources is the collaborative effort of the NCI, the SEER registries, and the Centers for Medicare and Medicaid Services. More information on the SEER-Medicare database can be found at their Web site (appliedresearch.cancer.gov/seermedicare/).

SEER-Stat database
The SEER-Stat database was used for the analysis of localized prostate cancer treatment patterns by disease severity and age. Prostate cancer is commonly diagnosed in nonhospital settings, and thus data are less complete for this site in the NCDB. We analyzed data from the 18 SEER registries for prostate cancer patients diagnosed during 2009 to 2010; cases with positive lymph nodes or metastases were excluded.\textsuperscript{9} Disease severity was based on risk categories as described in the National Comprehensive Cancer Network Clinical Practice Guidelines for Prostate Cancer.\textsuperscript{17} Use of androgen deprivation therapy (ADT) was not included in the analysis because this information is not collected by the SEER registries.

Selected Findings
Cancer Prevalence
Nearly 14.5 million Americans with a history of cancer were alive on January 1, 2014. This estimate does not include carcinoma in situ of any site except the urinary bladder, and does not include basal cell and squamous cell skin cancers. The 10 most common cancer sites represented among survivors are shown in Figure 1. Prostate cancer (43%), colorectal cancer (9%), and melanoma (8%) are the...
3 most common cancers among male cancer survivors and cancers of the breast (41%), uterine corpus (8%), and colon and rectum (8%) are the most common among female survivors. The majority of cancer survivors (64%) were diagnosed 5 or more years previously, and 15% were diagnosed 20 or more years ago (Table 1). Nearly one-half of cancer survivors (46%) are aged 70 years or older, whereas only 5% are aged younger than 40 years (Table 2). However, the age distribution of survivors varies substantially by cancer type. For example, the majority of prostate cancer survivors (62%) are aged 70 years or older, whereas less than one-third (32%) of melanoma survivors are in this older age group (Fig. 2). By January 1, 2024, it is estimated that the population of cancer survivors will increase to nearly 19 million individuals (9.3 million males and 9.6 million females) with the distribution of prevalent cancers expected to remain largely unchanged (Fig. 1).

**Selected Cancers**

**Breast (Female)**

It is estimated that there are more than 3.1 million women living in the United States with a history of invasive breast cancer, and an additional 232,670 women will be diagnosed in 2014. Approximately 72% of breast cancer survivors (nearly 2.3 million women) are aged 60 years and older and fewer than 10% are aged younger than 50 years (Fig. 2).

Breast cancer tends to be diagnosed at a younger age than other common cancers, with a median age at diagnosis of 61 years compared with 70 years for lung cancer and 69 years for colorectal cancer (Fig. 3). Approximately 20% of breast cancers are diagnosed in women aged younger than 50 years and 43% occur among women who are aged 65 years and older. Overall, 61% of breast cancers are diagnosed at a localized stage.4

**Treatment and survival**

Surgical treatment of breast cancer involves breast-conserving surgery (BCS) or mastectomy. When BCS is appropriately used for localized or regional cancers and followed with radiation to the breast, long-term survival is the same as with mastectomy.18 However, some patients require mastectomy because of large or multiple tumors. Increasingly, BCS-eligible women elect mastectomy for a variety of reasons, including reluctance to undergo radiation therapy after BCS or fear of recurrence.19 Younger women

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### TABLE 1. Estimated Number of US Cancer Survivors as of January 1, 2014, by Sex and Time Since Diagnosis

| YEARS SINCE DIAGNOSIS | NO. | PERCENT | CUMULATIVE PERCENT | NO. | PERCENT | CUMULATIVE PERCENT | NO. | PERCENT | CUMULATIVE PERCENT |
|-----------------------|-----|---------|---------------------|-----|---------|---------------------|-----|---------|---------------------|
| 0 to <5               | 5,149,350 | 36%     | 36%                 | 2,731,710 | 40%     | 40%                 | 2,417,640 | 32%     | 32%                 |
| 5 to <10              | 3,407,910 | 24%     | 59%                 | 1,739,950 | 25%     | 65%                 | 1,667,960 | 22%     | 54%                 |
| 10 to <15             | 2,263,770 | 16%     | 75%                 | 1,070,460 | 16%     | 81%                 | 1,193,310 | 16%     | 69%                 |
| 15 to <20             | 1,455,280 | 10%     | 85%                 | 617,230 | 9%      | 90%                 | 838,050 | 11%     | 80%                 |
| 20 to <25             | 912,890 | 6%      | 91%                 | 338,530 | 5%      | 94%                 | 574,360 | 8%      | 88%                 |
| 25 to <30             | 547,240 | 4%      | 95%                 | 175,620 | 3%      | 97%                 | 371,620 | 5%      | 93%                 |
| ≥30                   | 747,400 | 5%      | 100%                | 203,100 | 3%      | 100%                | 544,300 | 7%      | 100%                |

Note: Percentages do not sum to 100% due to rounding. Source: Data Modeling Branch, Division of Cancer Control and Population Sciences, National Cancer Institute.

### TABLE 2. Estimated Number of US Cancer Survivors as of January 1, 2014, by Sex and Age at Prevalence

| AGE | MALE AND FEMALE | MALE | FEMALE |
|-----|----------------|------|--------|
|     | NO. | PERCENT | CUMULATIVE PERCENT | NO. | PERCENT | CUMULATIVE PERCENT | NO. | PERCENT | CUMULATIVE PERCENT |
| All ages | 14,483,830 | 6,876,600 | 7,607,230 | 22,410 | 1% | 1% | 2,417,640 | 32% | 32% |
| 0–14 y | 60,620 | <1% | <1% | 38,210 | 1% | 1% | 2,731,710 | 40% | 40% |
| 15–19 y | 48,690 | <1% | 1% | 24,950 | <1% | 1% | 1,739,950 | 25% | 25% |
| 20–29 y | 185,500 | 1% | 2% | 77,470 | 1% | 2% | 617,230 | 9% | 9% |
| 30–39 y | 399,720 | 3% | 5% | 140,770 | 2% | 4% | 338,530 | 5% | 5% |
| 40–49 y | 985,470 | 7% | 12% | 347,780 | 5% | 9% | 175,620 | 3% | 3% |
| 50–59 y | 2,388,540 | 16% | 28% | 971,660 | 14% | 23% | 203,100 | 3% | 3% |
| 60–69 y | 3,811,640 | 26% | 54% | 1,858,250 | 27% | 50% | 1,858,250 | 27% | 50% |
| 70–79 y | 3,762,310 | 26% | 80% | 2,026,380 | 29% | 80% | 2,026,380 | 29% | 80% |
| ≥80 y | 2,841,340 | 20% | 100% | 1,391,130 | 20% | 100% | 1,391,130 | 20% | 100% |

Note: Percentages do not sum to 100% due to rounding. Source: Data Modeling Branch, Division of Cancer Control and Population Sciences, National Cancer Institute.
(those aged 40 years and younger) and patients with larger and/or more aggressive tumors are more likely to elect to undergo mastectomy.\textsuperscript{19,20} Women who undergo mastectomy may have breast reconstruction, either with a saline or silicone implant, tissue flap, or combination thereof. Although reported rates of breast reconstruction in the United States vary widely, a recent study found that among women with employer-based health insurance, rates have increased from 46% in 1998 to 63% in 2007.\textsuperscript{21} Women who are younger, white, have private insurance, or have a higher level of education or income are more likely to undergo reconstruction.\textsuperscript{22} Studies suggest that reconstruction is offered to only a fraction of eligible women.\textsuperscript{22}

Among women diagnosed with early-stage (stage I or II) breast cancer, 59% undergo BCS, 36% undergo mastectomy, 4% receive radiation therapy and/or chemotherapy without surgery, and approximately 1% do not receive any of these treatments. The majority of women with early-stage breast cancer who undergo BCS receive adjuvant treatment; 56% are treated with radiation therapy alone and approximately 29% receive both radiation therapy and chemotherapy (with or without targeted therapy). Most patients diagnosed with late-stage disease receive chemotherapy, sometimes along with surgery and other therapies.

The overall 5-year relative survival rate for patients with female breast cancer has improved from 74.8% in 1975 through 1977 to 90.3% in 2003 through 2009.\textsuperscript{7} This increase is due largely to improvements in treatment (ie, chemotherapy, hormone therapy, and targeted drugs) and to earlier diagnosis as a result of the widespread use of mammography for breast cancer screening.\textsuperscript{23} The 10-year and 15-year relative survival rates for breast cancer are 83.1% and 77.8%, respectively.

The 5-year relative survival rate for women diagnosed with localized breast cancer is 98.6%; for those with regional and distant-stage breast cancer, the survival rate declines to 84.4% and 24.3%, respectively.\textsuperscript{7} In addition to stage of disease, cancer-related factors that influence survival include tumor grade, hormone receptor status, and human epidermal growth factor receptor 2 (HER2) status.

Black women are less likely than white women to be diagnosed with local stage breast cancer (52% vs 62%) and
have lower rates of survival than white women within each
disease stage. The reasons for these differences are com-
plex but may be explained in large part by socioeconomic
factors, less access and use of quality medical care among
black women, and biological differences in cancers (eg, a
higher incidence of triple-negative cancers among black
women).24–26

Common long-term side effects of treatment
Lymphedema of the arm is a side effect of breast cancer
surgery and radiation therapy that occurs in approximately
20% of women who undergo axillary lymph node dissection
and 6% of women who undergo sentinel lymph node
biopsy.27 It is important for lymphedema to be diagnosed
as early as possible to optimize treatment and slow pro-
gression.28 There are a number of effective therapies for lym-
phedema and some evidence suggests that upper-body
exercise and physical therapy may reduce risk and lessen the
severity of this condition.28,29

Other long-term local effects of surgery and radiation
therapy include numbness, tingling, or tightness in the
chest wall, arms, or shoulders. Studies have shown that
between 25% and 60% of women develop chronic pain
after breast cancer treatment, although the pain is usually
not severe.30–33 In addition, treatment with chemother-
apy can lead to impaired fertility and premature meno-
pause, which increases the risk of osteoporosis.34

Anthracyclines and HER2-targeted drugs can lead to car-
diomyopathy and congestive heart failure. Treatment
with aromatase inhibitors, which is generally reserved for
postmenopausal women, can also cause osteoporosis, as
well as myalgia and arthralgia.35 Patients with breast can-
cer may also experience cognitive impairments and
chronic fatigue.36

FIGURE 3. Age Distribution of New Cases (%), Median Age at Diagnosis, Estimated Number of New Cases, and 5-Year
Relative Survival Rates by Cancer Site.
Note: Sites are ranked in order of median age at the time of diagnosis from oldest to youngest. Sources: Age distribution based on 2009 to 2010 data from
the North American Association of Central Cancer Registries and excludes Arkansas, Nevada, and Ohio.55 The median age at diagnosis and the 5-year relative
survival rate are based on cases diagnosed during 2006 to 2010 and 2003 to 2009, respectively, from the 18 Surveillance, Epidemiology, and End Results
(SEER) registries and were previously published in Howlader et al.7 2014 estimated cases were derived from Siegel et al.8
Cancers in Children and Adolescents

Approximately 1% of all new cancer diagnoses occur in children and adolescents. It is estimated that there are 60,620 cancer survivors aged birth to 14 years (children) and 48,690 survivors aged 15 to 19 years (adolescents) living in the United States as of January 1, 2014, and an additional 10,450 children and 5,330 adolescents will be diagnosed in 2014.

Among children, the 3 most commonly diagnosed cancers are acute lymphocytic leukemia (ALL) (26%), brain and central nervous system (CNS) tumors (21%), and neuroblastoma (7%). Among adolescents, the most common incident cancers are Hodgkin lymphoma (HL) (15%), thyroid cancer (11%), and brain and CNS tumors (10%).

Treatment and survival

Pediatric cancers can be treated with a combination of therapies (surgery, radiation therapy, chemotherapy, and targeted therapy) chosen based on the type and stage of cancer. Treatment often occurs in specialized centers and is coordinated by a team of experts, including pediatric oncologists, surgeons, nurses, social workers, psychologists, and others.

Childhood cancer survival rates vary considerably depending on cancer type, patient age, and other characteristics. The 5-year relative survival rate for children aged birth to 14 years is 97.5% for patients with retinoblastoma, 96.9% for patients with HL, 89.7% for patients with Wilms tumor, 88.8% for patients with ALL, 87.4% for patients with non-Hodgkin lymphoma (NHL), 78.1% for patients with neuroblastoma, 72.1% for patients with brain and CNS tumors, 70.9% for patients with osteosarcoma, and 66.7% for patients with rhabdomyosarcoma. The overall 5-year relative survival rate for all childhood cancers combined has improved markedly over the past 30 years due to new and improved treatments, from 57.9% for cases diagnosed between 1975 and 1979 to 83.1% for cases diagnosed during 2003 through 2009.

Common long-term side effects of treatment

Children diagnosed with cancer may experience treatment-related side effects not only during treatment but many years after diagnosis as well. Aggressive treatments used for childhood cancers, especially in the 1970s and 1980s, resulted in a number of late effects, including an increased risk of subsequent cancers. Even many newer less toxic therapies increase the risk of serious health conditions in long-term childhood cancer survivors. Hudson et al recently reported that among childhood cancer survivors diagnosed and treated between 1962 and 2001, 65% of those who were exposed to treatments with potential pulmonary toxicity experienced pulmonary dysfunction and 57% of those exposed to potentially cardiotoxic therapies experienced cardiac abnormalities. The risk of developing subsequent neoplasms is increased among survivors treated with radiotherapy, alkylating agents, anthracyclines, and epipodophyllotoxins, with genetic predisposition also playing a role. A large study of pediatric cancer survivors found that almost 10% developed a second cancer over the 30-year period after their initial diagnosis, most commonly female breast, thyroid, and brain and other CNS tumors. The Children’s Oncology Group, an NCI-supported clinical trials group that cares for more than 90% of US children and adolescents diagnosed with cancer, has developed long-term follow-up guidelines for the screening and management of late effects in survivors of childhood cancer.
It is important that survivors of pediatric cancers are monitored for long-term and late effects. For more information on childhood cancer management, see the Children’s Oncology Group Web site (survivorshipguidelines.org).

Cancers occurring in adolescents (those aged 15 to 19 years) are associated with a unique set of issues. Adolescents diagnosed with cancers that are more common in childhood are usually most appropriately treated at pediatric facilities or by pediatric specialists rather than by specialists in adult care. In addition, childhood cancer centers are more likely than adult cancer centers to offer patients the opportunity to participate in clinical trials. Studies have shown that for adolescent patients diagnosed with ALL, pediatric protocols result in better outcomes than adult protocols. For adolescent patients diagnosed with cancers that are more common among adults, such as melanoma and testicular and thyroid cancers, treatment by adult-care specialists is more appropriate. Although there have been less dramatic improvements in survival for cancers among adolescents compared with many childhood cancers, and even for some cancers in adults, the current 5-year relative survival rate for adolescents (84.5%) is similar to that for children (83.1%).

Colon and Rectum

It is estimated that as of January 1, 2014 there are more than 1.2 million men and women living in the United States with a previous colorectal cancer diagnosis, and an additional 136,830 cases will be diagnosed in 2014. Approximately 82% of colorectal cancer survivors (approximately 1 million men and women) are aged 60 years and older, while only 5% (67,120 individuals) are aged younger than 50 years (Fig. 2). The median age at diagnosis for colorectal cancer is 67 years for men and 71 years for women.

The use of recommended colorectal cancer screening tests can both detect cancer earlier and prevent colorectal cancer through the detection and removal of precancerous polyps. However, only 59% of men and women aged 50 years of age and older received colorectal cancer screening according to guidelines in 2010.
Treatment and survival

Treatment for cancers of the colon and rectum varies by tumor location and stage at diagnosis (Figs. 5 and 6). Surgery to remove the cancer (typically along with nearby lymph nodes) is the most common treatment of early-stage (stage I and II) colon (98%) and rectal (88%) cancer. A colostomy is more commonly used for rectal cancer (29%) than for colon cancer (12%) and is often temporary.

For patients with stage III and some stage II colon cancers, surgery is followed by approximately 6 months of chemotherapy to lower the risk of recurrence. In contrast, patients with stage II and III rectal cancers are often treated with neoadjuvant chemotherapy combined with radiation therapy.

Chemotherapy is often the main treatment of patients with advanced colon and rectal cancers. A growing number of targeted drugs are also available to treat metastatic colorectal cancer.

The 1-year and 5-year relative survival rates for patients with colorectal cancer are 83.4% and 64.9%, respectively. Survival continues to decline to 58.3% at 10 years after diagnosis. When colorectal cancers are detected at a localized stage, the 5-year relative survival rate is 90.3%. After the cancer has spread regionally to involve adjacent organs or lymph nodes, the 5-year survival rate drops to 70.4%. When the disease has spread to distant organs, the 5-year survival rate is 12.5%.

Common long-term side effects of treatment

Most long-term survivors of colorectal cancer report a psychological quality of life comparable to that of the general population, but a somewhat lower physical quality of life. Bowel dysfunction is particularly common, especially among those diagnosed with late-stage cancer, and some patients must live with a permanent ostomy. Individuals treated with radiation therapy to the pelvis are at risk of bladder problems. Cancer recurrence is common among colorectal survivors; approximately one-half of patients treated with surgery will experience a recurrence within the first 3 years after surgery. Colorectal cancer survivors are also at increased risk of second primary cancers of the colon and rectum, as well as other cancer sites, especially those within the digestive system.

Leukemias and Lymphomas

It is estimated that there are 316,210 leukemia survivors living in the United States, and an additional 52,380 individuals will be diagnosed with leukemia in 2014. Nearly 91% of leukemia patients are diagnosed at age 20 years and older. Acute myeloid leukemia (AML) and chronic lymphocytic leukemia (CLL) are the most common types of leukemia diagnosed in adults, whereas ALL is most common among children and adolescents. The median age at diagnosis is 14 years for patients with ALL, 71 years for patients with CLL, 67 years for patients with AML, and 64 years for patients with chronic myeloid leukemia (CML) (Fig. 3).

There are 2 basic categories of lymphoma: HL and NHL. NHLs can be further divided into indolent and aggressive categories, each of which includes many subtypes that progress and respond differently to treatment. Prognosis and treatment depend on the stage and type of lymphoma. It is estimated that as of January 1, 2014, there were 197,850 HL survivors and 569,820 NHL survivors.
An estimated 9190 and 70,800 new cases of HL and NHL, respectively, will be diagnosed in 2014. Although both HL and NHL occur in children and adults, the majority of HL cases (64%) are diagnosed before age 50 years, whereas most cases of NHL (83%) occur in those aged 50 years and older (Fig. 3).

Treatement and survival for the most common types of leukemia and lymphoma

Acute myeloid leukemia

Chemotherapy is the standard treatment of patients with AML (Fig. 7), although many older adults, among whom the disease is most common, are not able to tolerate the most aggressive and potentially curative protocols. Some patients also undergo stem cell transplantation and some receive radiation therapy (often as part of a conditioning regimen prior to stem cell transplantation).

Approximately 60% to 70% of adults with AML can expect to attain complete remission status after the first phase of treatment (induction), and more than 25% of adults survive 3 or more years and may be cured.49 Approximately 3% of AML cases occur in children aged 14 years and younger, for whom the prognosis is substantially better than that for adults. Survival for AML decreases markedly with age at diagnosis. The 5-year relative survival rate for children and adolescents (aged birth–19 years) is 62.8%, but declines to 48.8%, 28.0%, and 5.4% for patients ages 20 to 49 years, 50 to 64 years, and 65 years or older, respectively.

Chronic myeloid leukemia

CML (also called chronic myelogenous leukemia) is most common in adults, but approximately 2% of cases are diagnosed in children and adolescents. In large part due to the discovery and widespread use of BCR-ABL tyrosine kinase inhibitors, the 5-year survival rate for patients with CML increased from 30.6% for cases diagnosed during 1990 through 1992 to 58.6% for those diagnosed during 2003 through 2009.

Acute lymphocytic leukemia

Although ALL (also called acute lymphoblastic leukemia) is the most common type of leukemia diagnosed in children, nearly one-half (49%) of cases are diagnosed in patients aged 20 years and older. Chemotherapy is the standard treatment of patients with ALL (Fig. 7). Approximately 20% to 30% of adult ALL cases and less than 5% of childhood cases are Philadelphia chromosome positive and may benefit from the addition of a BCR-ABL tyrosine kinase inhibitor to chemotherapy.50,51 More than 95% of children and about 80% to 90% of adults with ALL attain remission.52 Allogeneic bone marrow transplantation is recommended for some patients whose leukemia has high-risk characteristics at diagnosis and for those who develop recurrence after remission. It may also be used if the leukemia does not go into remission after successive courses of induction chemotherapy.

Survival rates for patients with ALL have increased significantly over the past 3 decades, particularly among children. For example, the 5-year relative survival rate for children (those aged birth to 14 years) increased from 57.2% in the mid-1970s to 91.7% in 2003 through 2009.7 Previous studies have also documented lower survival rates for black children with ALL compared with white children.53 Notably, the black-white survival disparity in children and adolescents has diminished in recent years from a 21% difference in 5-year survival for ALL during 1980 through 1984 (47% vs 68%, respectively) to a 6% difference during 2003 through 2009 (84% vs 90%, respectively).37 Survival declines with increasing age; the current 5-year survival rate is 41.8% for individuals aged 20 to 39 years, 28.2% for those aged 40 to 64 years, and 11.8% for those aged 65 years and older.

Chronic lymphocytic leukemia

CLL is the most common type of leukemia in adults; 95% of cases are diagnosed in individuals aged 50 years and older (Fig. 3). Treatment is not likely to cure CLL and it is not clear that it extends survival; therefore, it is generally reserved for patients who are symptomatic or who have cytopenias or other complications of their disease. For patients with uncomplicated early disease, active surveillance is a common initial treatment approach. It should be noted that the low rates of chemotherapy shown for adult CLL in Figure 7 are the first course of treatment and do not reflect those patients who receive chemotherapy later in the course of disease. For patients with more advanced disease, available treatments include chemotherapy, immunotherapy, targeted therapy, radiation therapy, and splenectomy. The overall 5-year relative survival rate for patients with CLL is 79.2%; however, there is a large variation in survival among individual patients, ranging from several months to a normal life expectancy. Approximately 5% to 10% of patients with CLL also develop diffuse large B-cell lymphoma (DLBCL), a process known as “Richter transformation.”54

Hodgkin lymphoma

HL can be diagnosed at any age, but is most common in early adulthood (60% of patients are diagnosed between ages 15 and 49 years) (Fig. 3). There are 2 major types of HL. Classic HL (CHL) is the most common and is characterized by the presence of Reed-Sternberg cells. Nodular lymphocyte-predominant HL (NLPHL), which is characterized by “popcorn cells,” comprises only 5% of cases.55 NLPHL is a more indolent disease with a generally favorable prognosis.56

CHL is generally treated with multiagent chemotherapy (81%), sometimes in combination with radiation therapy
Although the use of chemotherapy recipients, although the use of radiation therapy is declining. If these treatments are not effective, stem cell transplantation may be an option. For patients with NLPHL, radiation alone may be appropriate for those with early-stage disease. For those with later-stage disease, chemotherapy plus radiation therapy, as well as the monoclonal antibody rituximab, may be recommended.

The 5-year relative survival rate for all HL combined has improved from 71.8% during 1975 through 1977 to 87.6% during 2003 through 2009. The current 1-year and 10-year survival rates are 92.0% and 80.2%, respectively. The overall 5-year survival rate is 95.6% for NLPHL and 84.6% for CHL.

**Non-Hodgkin lymphoma**

The most common types of NHL are DLBCL, representing 37% of cases, and follicular lymphoma, representing 20% of cases. DLBCLs grow quickly, yet most patients with localized disease and approximately 50% of patients with advanced-stage disease are cured. In contrast, follicular lymphomas tend to grow slowly and often do not require treatment until the patient becomes symptomatic; however, many are not curable. Some cases of follicular lymphoma transform into DLBCL. Burkitt lymphoma is a much less common and very aggressive NHL subtype, although it is often curable with intense treatment.

The first course of treatment for all NHL subtypes combined is usually chemotherapy, either alone (57%) or in combination with radiation therapy (12%); radiation therapy without chemotherapy (7%) is used less often (Fig. 8). Approximately 8% of patients receive surgical treatment only and 16% of patients receive none of these treatments. A monoclonal antibody such as rituximab is often given along with chemotherapy for the treatment of B-cell lymphomas.

The 5-year relative survival rate for all cases of NHL combined is 69.0%; by subtype, the 5-year survival rate is 85.4% for follicular lymphoma, 60.5% for DLBCL, and 57.1% for Burkitt lymphoma.

**Common long-term side effects of treatment**

Patients treated for leukemia and lymphoma can experience a number of significant late effects. One of the most serious potential long-term side effects of ALL therapy in children is the development of AML, which occurs in approximately 5% of patients who receive epipodophyllotoxins (eg, etoposide or teniposide) or alkylating agents (eg, cyclophosphamide or chlorambucil). In the past, some children with ALL received cranial radiation therapy to reduce the risk of CNS recurrence; however, this treatment can cause long-term cognitive deficits and is rarely used today.

Chest radiation for HL increases the risk of cardiac dysfunction (eg, valvular heart disease and coronary artery disease), as well as breast cancer among women. Patients with HL and NHL are commonly treated with anthracyclines, which can also be cardiotoxic. Some leukemia and lymphoma survivors have problems with recurrent infections and anemia, which may require blood transfusions.

**Lung and Bronchus**

It is estimated that there are 430,090 men and women living in the United States with a history of lung cancer, and an additional 224,210 cases will be diagnosed in 2014. The median age at diagnosis for lung cancer is 70 years.

In January 2013, the American Cancer Society issued guidelines for the early detection of lung cancer, which endorse a process of shared decision-making between clinicians who have access to high-volume, high-quality lung cancer screening programs and current or former (quit within the previous 15 years) adult smokers with at least a 30-pack-year history of smoking who are 55 to 74 years of age and in good health. Shared decision-making should include a discussion of the benefits, uncertainties, and harms associated with lung cancer screening.

**Treatment and survival**

Lung cancer is classified as small cell lung cancer (13% of cases) or non-small cell lung cancer (NSCLC) (87%) for the purposes of treatment. Most patients with small cell lung cancer receive chemotherapy. In addition, patients with limited-stage disease often receive concurrent radiation therapy. For patients with early-stage NSCLC, the majority of patients (68%) undergo surgery and approximately 16% also receive chemotherapy or radiation therapy. Most patients with advanced-stage NSCLC are treated with chemotherapy alone (18%), radiation therapy...
alone (15%), or a combination thereof (33%). The targeted therapy bevacizumab is used by 15% of chemotherapy recipients in the SEER-Medicare database. Other targeted drugs used to treat NSCLC include erlotinib and afatinib, which target the epidermal growth factor receptor protein, and crizotinib, which targets cells with activating ALK mutations.

The majority of lung cancers (57%) are diagnosed at a distant stage because early disease is typically asymptomatic; only 15% of cases are diagnosed at a local stage. The 1-year relative survival rate for lung cancer increased from 34.4% in 1975 through 1977 to 44.7% in 2006 through 2009, largely due to improvements in surgical techniques and chemoradiation. The 5-year survival rate is 53.5% for cases detected when the disease is still localized, 26.1% for patients with regional disease, and 3.9% for patients with distant-stage disease. The overall 5-year survival rate for small cell lung cancer (6.3%) is lower than that for NSCLC (18.2%).

Common long-term side effects of treatment
Many lung cancer survivors have impaired lung function, especially if they have undergone surgery. In some cases, respiratory therapy and medications can improve fitness and allow survivors to resume normal daily activities. Lung cancer survivors, particularly those who continue to smoke, are at an increased risk of additional smoking-related diseases including second cancers, especially in the lung, head and neck, and urinary tract. Survivors may feel stigmatized because of the social perception that lung cancer is a self-inflicted disease, which can be particularly difficult for lung cancer survivors who never smoked.

Melanoma
It is estimated that there are more than 1 million melanoma survivors living in the United States, and an additional 76,100 individuals will be diagnosed in 2014. Approximately 68% of melanoma survivors (708,350 men and women) are aged younger than 70 years, including 215,820 survivors who are aged younger than 50 years (Fig. 2). Melanoma incidence rates have been increasing for at least 30 years. Approximately 84% of melanomas are diagnosed at a localized stage, when they are highly curable. The median age at diagnosis for melanoma is 64 years for men and 57 years for women. Although melanoma is uncommon before age 30 years, it is the second and fourth most commonly diagnosed cancer in women and men aged 20 to 29 years, respectively.

Treatment and survival
Surgery is the primary treatment of most melanomas. Less than 3% of all patients with melanoma undergo radiation therapy. However, nearly one-half (45%) of patients with metastatic disease who receive either chemotherapy or immunotherapy also undergo radiation therapy. Patients with stage III melanomas are often offered adjuvant immunotherapy with interferon for approximately one year; however, this treatment has side effects that make it very difficult to tolerate. Treatment for patients with stage IV melanoma has changed in recent years and typically includes immunotherapy or targeted therapy drugs. The immunotherapy drug ipilimumab has been shown to extend survival in patients with advanced melanoma. Approximately one-half of patients with melanoma have mutations in the BRAF gene; several targeted drugs have been shown to be helpful against these melanomas.

The 5-year and 10-year relative survival rates for patients with melanoma are 91.3% and 89.3%, respectively. For those with localized melanoma, the 5-year survival rate is 98.3%; 5-year survival rates for patients with regional-stage and distant-stage disease are 62.4% and 16.0%, respectively.

Common long-term side effects of treatment
Depending on the size and location of the melanoma, removal of these cancers can be disfiguring. Men and women who are survivors of melanoma are nearly 13 times and 16 times, respectively, more likely than the general
population to develop additional melanomas due to skin type and other genetic risk factors and/or overexposure to ultraviolet radiation. Approximately 10% to 15% of patients treated with ipilimumab experience serious autoimmune-related side effects, which can lead to death. Patients treated with BRAF inhibitors have an increased risk of developing additional skin cancers.

Prostate

It is estimated that there are nearly 3 million men living with prostate cancer in the United States, and an additional 233,000 cases will be diagnosed in 2014. The majority (62%) of prostate cancer survivors are over the age of 70 years; less than 2% (24,500 men) are younger than age 50 years (Fig. 2). The median age at diagnosis is 66 years (Fig. 3). Most prostate cancers in the United States are diagnosed by prostate-specific antigen testing, although many expert groups, including the American Cancer Society, have concluded that data on the efficacy of prostate-specific antigen screening are insufficient to recommend the routine use of this test.

Treatment and survival

Treatment options vary depending on disease severity, as well as patient characteristics such as age and comorbidity and personal preferences. Figure 10 shows primary treatment by disease severity among men with localized prostate cancer diagnosed during 2009 through 2011 in the 18 SEER registries. Data regarding the use of ADT are not available in the SEER data and therefore are not included. Across all risk categories, younger men (those aged younger than 65 years) are more likely to be treated with radiation therapy, radical prostatectomy, or a combination thereof, whereas the majority of men aged 75 years or older did not receive either of these treatments.

Survival rates are favorable for patients with early-stage disease treated with surgery or radiation therapy; however, both are associated with risks of physical impairments (sexual, urinary, and bowel). Active surveillance rather than immediate treatment is a reasonable and commonly recommended approach, especially for older men and those with less aggressive tumors and/or more serious comorbid conditions. ADT, chemotherapy, bone-directed therapy (such as zoledronic acid or denosumab), radiation therapy, or a combination of these treatments are used to treat patients with more advanced disease. Newer treatments approved in recent years to treat patients with advanced prostate cancer that is no longer responding to traditional hormone therapy include the dendritic cell vaccine sipuleucel-T (Provenge; Dendreon Corporation, Seattle, Wash) and newer forms of hormone therapy include abiraterone (Zytiga; Janssen Biotech, Inc, Horsham, Pa) and enzalutamide (Xtandi; Astellas Pharma Inc, Northbrook, Ill), and Radium-223 (Xofigo; Bayer HealthCare Pharmaceuticals Inc, Whippany, NJ), a form of radiation therapy that is given as an injection into the bone.

Most (93%) prostate cancers are discovered in the local or regional stages, for which the 5-year relative survival rate approaches 100%. Over the past 25 years, the 5-year relative survival rate for all stages combined has increased from 67.8% to 99.7%. The 10-year and 15-year relative survival rates are 98.8% and 94.3%, respectively.

Common side effects of treatment

Many prostate cancer survivors who have been treated with surgery or radiation therapy experience urinary

FIGURE 10. Localized Prostate Cancer Treatment Patterns by Disease Severity and Age: United States, 2009 Through 2011.

RT indicates radiation therapy. Patients with missing treatment data were excluded. Risk categories based on National Comprehensive Cancer Network Clinical Practice Guidelines for Prostate Cancer. Source: Surveillance, Epidemiology, and End Results (SEER) Program, SEER 18 Registries, Division of Cancer Control and Population Sciences, National Cancer Institute.
incontinence, erectile dysfunction, and bowel complications. Patients receiving hormonal treatment may experience a loss of libido; erectile dysfunction; menopausal-like symptoms including hot flashes, night sweats, and irritability; and gynecomastia. ADT also increases the risk of anemia, osteoporosis, and metabolic syndrome. Although some studies have found an increased risk of cardiovascular disease or death associated with the use of hormone therapy, the evidence is inconsistent.

Careful monitoring of cardiovascular risk factors and serum glucose is recommended in men who have received ADT.

Testis

It is estimated that there are 244,110 testicular cancer survivors in the United States, and an additional 8820 men will be diagnosed in 2014. TGCTs account for approximately 96% of all testicular cancers. There are 2 main types of TGCTs: seminomas and nonseminomas. Nonseminomas are more common, generally occur in men in their late teens to early 40s, and tend to be more aggressive than seminomas. Seminomas are slow-growing and are generally diagnosed in men in their late 30s to early 50s.

Treatment and survival

Treatment of almost all TGCTs begins with orchiectomy. After orchiectomy, patients with early-stage seminomas are often treated with radiation therapy (42%) or active surveillance, with chemotherapy used less often (Fig. 11). Over the last decade, postsurgery active surveillance has become an increasingly preferred management option for patients with stage I seminomas and long-term study results support this treatment strategy. Patients with late-stage seminomas are generally treated with surgery and chemotherapy (68%) (Fig. 11). Among patients with early-stage nonseminomas, approximately 22% undergo retroperitoneal lymph node dissection, which is recommended to reduce the likelihood of recurrence (Fig. 12). Patients with late-stage nonseminomas are treated with orchiectomy followed by chemotherapy, and some require additional surgery after the completion of chemotherapy.

Most testicular cancers are detected early; 69% of cases are diagnosed at a localized stage. For all testicular cancers combined, the 5-year relative survival rates are 99.1%, 95.8%, and 73.8% for tumors diagnosed at a localized, regional, or distant stage, respectively.

Common long-term side effects of treatment

Survivors of testicular cancer are often concerned about sexual and reproductive impairments. Although most men who have one healthy testicle produce sufficient male hormones and sperm to continue sexual relations and father children, sperm banking is recommended prior to treatment. Retroperitoneal lymph node dissection can lead to retrograde ejaculation, making unassisted reproduction impossible. Men treated with chemotherapy have increased risks of coronary artery disease as they age, and should be particularly mindful of risk factors such as hyperlipidemia, hypertension, obesity, and smoking. Men who have bilateral tumors have both testes removed and require lifelong testosterone supplementation.

Thyroid

It is estimated that there are 600,360 individuals living with a previous thyroid cancer diagnosis in the United States, and an additional 62,980 cases will be diagnosed in 2014. Thyroid cancer is the most rapidly increasing cancer in the United States and has been increasing worldwide over the past few decades. Some studies suggest that the rise is primarily due to the increased detection of small tumors through ultrasound and confirmation via fine-needle aspiration, perhaps resulting in some overdiagnoses.
However, others argue that the increase is in part real, and involves both small and large tumors. Thyroid cancer commonly occurs at a younger age than most other adult cancers; the median age at diagnosis is 54 years for men and 49 years for women.

Treatment and survival

Most thyroid cancers are either papillary or follicular carcinoma, both of which are highly curable. Approximately 3% of thyroid cancers are medullary or anaplastic carcinoma, which are more difficult to treat because they grow more quickly, have often metastasized by the time they are diagnosed, and do not respond to radioactive iodine treatment. The first choice of treatment in nearly all cases is surgery, with most patients undergoing total (84%) or partial thyroidectomy (13%). Approximately 56% of surgically treated patients with papillary or follicular thyroid cancer receive radioactive iodine (I-131) after surgery to destroy any remaining thyroid tissue. After total thyroidectomy, thyroid hormone therapy is required and is often prescribed in a dosage sufficient to inhibit pituitary production of thyroid-stimulating hormone to decrease the likelihood of recurrence.

Total thyroidectomy is the primary treatment of patients with medullary thyroid cancer. When the tumor is extensive or cannot be completely resected, radiation therapy may be given after surgery to try to reduce the chance of local recurrence. Targeted drugs, including vandetanib and cabozantinib, can be useful in treating patients with metastatic disease. Anaplastic thyroid cancers are often widespread at the time of diagnosis; in selected cases, radiation therapy alone or in combination with chemotherapy may be used to try and reduce the size of the tumor and allow for surgical removal. Chemotherapy and/or radiation therapy may be used to treat patients with advanced disease, though the prognosis is poor.

Localized disease is diagnosed in 59% of male patients and 71% of female patients. The 5-year relative survival rate for all patients with thyroid cancer is 97.7%. However, survival varies by stage of disease, age at diagnosis, and histologic type. The 5-year survival rate is 99.9%, 97.4%, and 55.0% for patients with localized, regional, and distant-stage disease, respectively. For all stages combined, survival declines with age; rates are 99.6% for patients aged 45 years and younger and 84.9% for those aged 75 years and older.

Common long-term side effects of treatment

Patients who undergo total thyroidectomy require thyroid replacement therapy, and thyroid hormone levels must be monitored to prevent hypothyroidism and problems such as cold intolerance and weight gain. Surgical removal of the thyroid gland can damage the underlying parathyroid glands, leading to issues with calcium metabolism. Surgery can also damage nerves to the larynx and lead to voice changes. Treatment with radioactive iodine can affect fertility and may be linked to an increased risk of leukemia. Among patients believed to be cured after treatment, approximately 10% to 30% experience recurrence or distant metastases. Approximately 25% of medullary thyroid cancers occur as part of a genetic syndrome (multiple endocrine neoplasia type 2), and therefore patients should be screened for other syndromic cancers and referred for genetic counseling and possible testing.

Urinary Bladder

It is estimated that there are 608,620 urinary bladder cancer survivors living in the United States, and an additional 74,690 cases will be diagnosed in 2014. Bladder cancer incidence is approximately 4 times higher in...
men than in women. The median age at diagnosis is 73 years. Approximately 75% of patients with bladder cancer are diagnosed with non–muscle-invasive bladder cancer.

**Treatment and survival**

Treatment for urinary bladder cancer varies by stage and patient age. Among patients with non–muscle-invasive cancers, most patients are diagnosed and treated with transurethral resection of the bladder tumor (TURBT), which may be followed by chemotherapy (18%) or intravesical biological therapy with bacillus Calmette-Guerin (25%). Although the NCDB does not distinguish between systemic and intravesical chemotherapy, based on treatment guidelines it is likely that virtually all of the chemotherapy represents intravesical administration.

Among patients with muscle-invasive disease, 42% undergo cystectomy, and nearly one-half of these patients also receive chemotherapy or radiation therapy (Fig. 13). Approximately 9% of patients undergo TURBT combined with chemotherapy and radiation therapy. In appropriately selected cases, TURBT followed by combined chemotherapy and radiation therapy is reported to be as effective as cystectomy at preventing recurrence. Chemotherapy is usually the first treatment among patients with advanced bladder cancer. For locally advanced cancers, patients may be offered chemotherapy either alone (32%) or in combination with radiation therapy (11%) before cystectomy.

For all stages combined, the 5-year relative survival rate is 77.9%. Survival declines to 71.4% at 10 years and 66.5% at 15 years after diagnosis. When in situ urinary bladder cancer is diagnosed (51% of cases), the 5-year survival rate is 96.4%. Patients with invasive tumors diagnosed at a localized stage have a 5-year survival rate of 70.2%; 35% of cancers are detected at this early stage. For those with regional and distant-stage disease, the 5-year survival rate is 33.0% and 5.4%, respectively.

**Common concerns of urinary bladder cancer survivors**

Bladder cancer are actively monitored after treatment because of the high rate of recurrence (estimates range from 50%-90%). Surveillance can include screening for urine biomarkers and cytology, as well as cystoscopy. Patients requiring repeated bladder surgeries can end up with a small or scarred bladder, which may lead to urinary frequency or other problems. Patients undergoing cystectomy require urinary diversion with either construction of a neobladder with urethral anastomosis or a urostomy. A recent study reported comparable outcomes with both techniques; however, a neobladder remains less common than urostomy (9% vs 91%). The neobladder procedure is more common among patients who are male, younger, healthy, or treated at larger higher-volume hospitals.

**Uterine Corpus**

There are an estimated 624,890 women living in the United States with a previous diagnosis of cancer of the uterine corpus, not otherwise specified, and an additional 52,630 cases will be diagnosed in 2014. Uterine cancer is the second most prevalent cancer among women, following breast cancer. The median age at diagnosis is 61 years (Fig. 3). Obese women are approximately 3 times more likely to develop uterine cancer than women of normal weight.

**Treatment and survival**

Uterine cancers are usually treated with surgery, radiation therapy, hormone therapy, and/or chemotherapy, depending on stage of disease and histologic type (Fig. 14). Surgery alone, consisting of hysterectomy (often along with bilateral salpingo-oopherectomy), is used to treat 72% of patients with early-stage disease. Approximately 22% of early-stage disease is high-risk disease and is treated with radiation either alone, or in combination with chemotherapy, in addition to surgery. The majority (64%) of women with advanced disease undergo surgery followed by radiation therapy and/or chemotherapy. Clinical trials are currently assessing the most appropriate regimen of radiation therapy and chemotherapy for women with metastatic or recurrent uterine cancer.

Most cancers of the uterine corpus (68%) are diagnosed at an early stage, usually because of postmenopausal bleeding. The 1-year and 5-year relative survival rates for
patients with cancer of the uterine corpus are 92.1% and 81.5%, respectively. The 5-year survival rate is 95.3% for localized disease, 67.5% for regional disease, and 16.9% for distant-stage disease. The overall 5-year survival for white women (84%) is 23% higher than that for black women (61%). Higher body weight adversely affects endometrial cancer survival, whereas physical activity is associated with improved survival.

Common long-term side effects of treatment

Any hysterectomy causes infertility. Bilateral oophorectomy will cause menopause in premenopausal women, which can lead to symptoms such as hot flashes, night sweats, vaginal dryness, and osteoporosis. Long-term side effects of radiation therapy for uterine cancer can include bladder and bowel dysfunction, as well as vaginal dryness and stenosis. Sexual problems are commonly reported among uterine cancer survivors. Pelvic lymphadenectomy can lead to lower extremity lymphedema, particularly for women who also receive radiation therapy.

Conclusion

In this article, we document the continued growth of the cancer survivor population in the United States and describe patterns of treatment and common side effects across several prevalent cancers. While some side effects are acute and short-lived, others can persist and become chronic. Other side effects can emerge months or even years after the completion of treatment and are referred to as late effects. The type and prevalence of these side effects vary with clinical factors (eg, cancer type and treatment) and patient characteristics (eg, age, sex, and comorbidity). Thus, it is important for providers to understand the unique medical and psychosocial needs of survivors and be aware of resources that can assist patients, caregivers, and health care providers in navigating the various phases of cancer survivorship.

The American College of Surgeons CoC has issued standards for quality, patient-centered cancer care that include recommendations for patient navigation, palliative care, distress management, and survivorship care planning. The Alliance for Quality Psychosocial Cancer Care is a coalition of professional and advocacy organizations, including the American Cancer Society, formed to advance these recommendations. The Alliance recently issued a comprehensive resource guide available to assist CoC-accredited facilities in meeting the new standards.

After the completion of primary cancer treatment, survivors often return to their primary care provider for medical care. A number of organizations have begun to produce guidelines to assist primary care physicians in the provision of care for patients with a history of cancer. These guidelines focus on ongoing surveillance and cancer screening, as well as the assessment and management of long-term and late effects of cancer and its treatment. There is also increasing emphasis on improving the overall well-being and quality of life of cancer survivors through the application of principles of disease self-management and the promotion of healthy lifestyles, such as avoiding tobacco, maintaining a healthy body weight, and being physically active throughout life.

Despite increasing awareness of survivorship issues, many challenges remain. These include a fractured health care system; poor integration of survivorship care in the oncology and primary care settings; lack of strong evidence-based guidelines for posttreatment care (although some have begun to emerge); and financial and other barriers to quality care, particularly among the medically underserved. To address these challenges, ongoing efforts to identify best practices for the delivery of quality posttreatment cancer care are needed. For example, it is not yet clear who should provide survivorship care services and how they will be reimbursed. Future research should also focus on identifying the best methods to encourage cancer survivors to...
adopt and maintain a healthy lifestyle. Models for the integration of comprehensive care for cancer survivors, including self-management, wellness and healthy lifestyle promotion, and cancer rehabilitation, are beginning to emerge. As the evidence base widens, efforts at the individual, provider, system, and policy levels should improve our ability to help cancer survivors live longer and healthier lives.

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