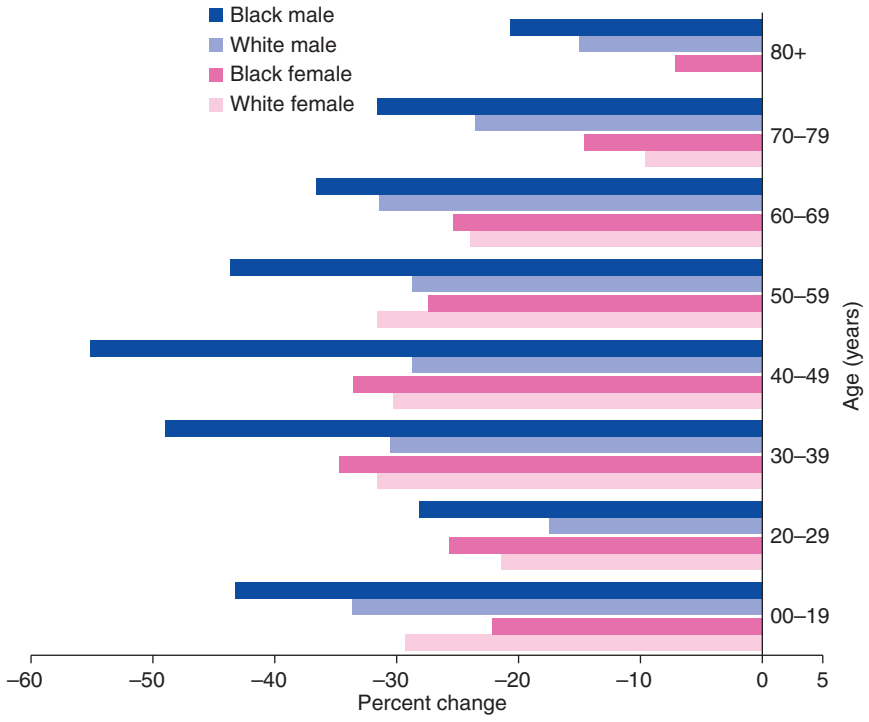


**FIGURE 99-3** **The decline in death rates from cancer** is shown for different age ranges by sex and race for the 20-year period between 1991 and 2010 expressed as a percentage of the 1991 rate. *(From R Siegel et al: CA Cancer J Clin 64:9, 2014.)*



## DEFINING THE EXTENT OF DISEASE AND THE PROGNOSIS

The first priority in patient management after the diagnosis of cancer is established and shared with the patient is to determine the extent of disease. The curability of a tumor usually is inversely proportional to the tumor burden. Ideally, the tumor will be diagnosed before symptoms develop or as a consequence of screening efforts (Chap. 100). A very high proportion of such patients can be cured. However, most patients with cancer present with symptoms related to the cancer, caused either by mass effects of the tumor or by alterations associated with the production of cytokines or hormones by the tumor.

For most cancers, the extent of disease is evaluated by a variety of noninvasive and invasive diagnostic tests and procedures. This process is called *staging*. There are two types. *Clinical staging* is based on physical examination, radiographs, isotopic scans, computed tomography (CT) scans, and other imaging procedures; *pathologic staging* takes into account information obtained during a surgical procedure, which might include intraoperative palpation, resection of regional lymph nodes and/or tissue adjacent to the tumor, and inspection and biopsy of organs commonly involved in disease spread. Pathologic staging includes histologic examination of all tissues removed during the surgical procedure. Surgical procedures performed may include a simple lymph node biopsy or more extensive procedures such as thoracotomy, mediastinoscopy, or laparotomy. Surgical staging may occur in a separate procedure or may be done at the time of definitive surgical resection of the primary tumor.

Knowledge of the predilection of particular tumors for spreading to adjacent or distant organs helps direct the staging evaluation.

Information obtained from staging is used to define the extent of disease as localized, as exhibiting spread outside of the organ of origin to regional but not distant sites, or as metastatic to distant sites. The most widely used system of staging is the TNM (tumor, node, metastasis) system codified by the International Union Against Cancer and the American Joint Committee on Cancer. The TNM classification is an anatomically based system that categorizes the tumor on the basis of the size of the primary tumor lesion (T1–4, where a higher number indicates a tumor of larger size), the presence of nodal involvement (usually N0 and N1 for the absence and presence, respectively, of involved nodes, although some tumors have more elaborate systems of nodal grading), and the presence of metastatic disease (M0 and M1 for the absence and presence, respectively, of metastases). The various permutations of T, N, and M scores (sometimes including tumor histologic grade [G]) are then broken into stages, usually designated by the roman numerals I through IV. Tumor burden increases and curability decreases with increasing stage. Other anatomic staging systems are used for some tumors, e.g., the Dukes classification for colorectal cancers, the International Federation of Gynecologists and Obstetricians classification for gynecologic cancers, and the Ann Arbor classification for Hodgkin's disease.

Certain tumors cannot be grouped on the basis of anatomic considerations. For example, hematopoietic tumors such as leukemia, myeloma, and lymphoma are often disseminated at presentation and do not spread like solid tumors. For these tumors, other prognostic factors have been identified (Chaps. 132-136).

In addition to tumor burden, a second major determinant of treatment outcome is the physiologic reserve of the patient. Patients who are bedridden before developing cancer are likely to fare worse, stage for stage, than fully active patients. Physiologic reserve is a determinant of how a patient is likely to cope with the physiologic stresses imposed by the cancer and its treatment. This factor is difficult to assess directly. Instead, surrogate markers for physiologic reserve are used, such as the patient's age or Karnofsky performance status (Table 99-4) or Eastern Cooperative Oncology Group (ECOG) performance status

**TABLE 99-2** **THE FIVE LEADING PRIMARY TUMOR SITES FOR PATIENTS DYING OF CANCER BASED ON AGE AND SEX IN 2010**

| | | | Age, years | | | | |
|---|---|---|---|---|---|---|---|
| Rank | Sex | All Ages | Under 20 | 20–39 | 40–59 | 60–79 | >80 |
| 1 | M | Lung | Leukemia | Leukemia | Lung | Lung | Lung |
| | F | Lung | Leukemia | Breast | Breast | Lung | Lung |
| 2 | M | Prostate | CNS | CNS | Colorectal | Colorectal | Prostate |
| | F | Breast | CNS | Cervix | Lung | Breast | Breast |
| 3 | M | Colorectal | Bone sarcoma | Colorectal | Liver | Prostate | Colorectal |
| | F | Colorectal | Bone sarcoma | Leukemia | Colorectal | Colorectal | Colorectal |
| 4 | M | Pancreas | Soft tissue sarcoma | Lymphoma | Pancreas | Pancreas | Bladder |
| | F | Pancreas | Soft tissue sarcoma | Colorectal | Ovary | Pancreas | Pancreas |
| 5 | M | Liver | Lymphoma | Lung | Esophagus | Liver | Pancreas |
| | F | Ovary | Liver | CNS | Pancreas | Ovary | Lymphoma |

***Abbreviations:*** CNS, central nervous system; F, female; M, male.

***Source:*** From R Siegel et al: Cancer statistics, 2014. CA Cancer J Clin 64:9, 2014.