HISTOLOGIC GRADE AND STAGE

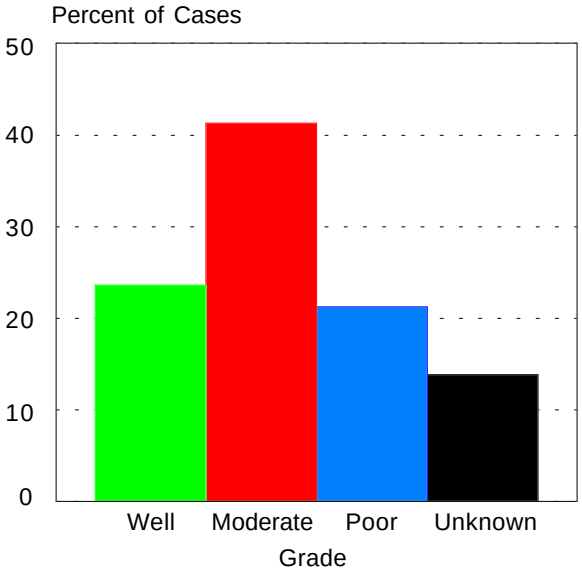
Histologic grade and clinical or pathological stage are used as descriptors of biological potential in prostate cancer. These measures are associated with likelihood of survival and with choice of treatment.

Grade is determined by a pathologist examining a sample of the tumor under a microscope. Normal tissue is composed of cells arranged in highly organized structures unique to each organ. Cancers show varying degrees of loss of this highly organized structure. Before the 1980s, the degree of this loss of organization in prostate cancer was described by pathologists as the histologic grade. Grade has three categories, based on the degree of tissue organization: well differentiated, moderately differentiated, and poorly differentiated. Tumors that are not classified by pathologists are listed as having unknown grade. A new method for describing the grade of prostate cancers, the Gleason score, was implemented in the 1980s. In this method, pathologists assign a score from 2 to 10 based on the patterns of tissue architecture. In order to compare tumor grades from earlier and later time periods, SEER has equated Gleason scores with the three grade categories as follows: tumors with Gleason scores of 2-4 are classified as well differentiated, scores of 5-7 as moderately differentiated, and scores of 8-10 as poorly differentiated (or undifferentiated).

Describing the variations and trends of histologic grades is useful for understanding the biology of prostate cancer and the import of the recent epidemic increase in prostate cancer incidence rates following the introduction of the prostate-specific antigen (PSA) test. Grade and stage of disease trends presented in this chapter are based on data from the 9 standard SEER registries.

Most prostate cancers diagnosed during the 1973-1995 time period were moderately differentiated (Figure 3.1). The overall distribution of grade varied by age and race. Elderly men had a lower proportion of moderately differentiated tumors and a higher proportion of poorly differentiated and unknown grade tumors (Figure 3.2). An assessment of grade distribution by race reveals that blacks have a slightly higher proportion of poorly differentiated and unknown grade tumors (Figure 3.3). Blacks have higher age-adjusted incidence rates than whites for each differentiation category (Figure 3.4).

Figure 3.1
Prostate Cancer Cases
Distribution by Grade
SEER Program, 1973-1995

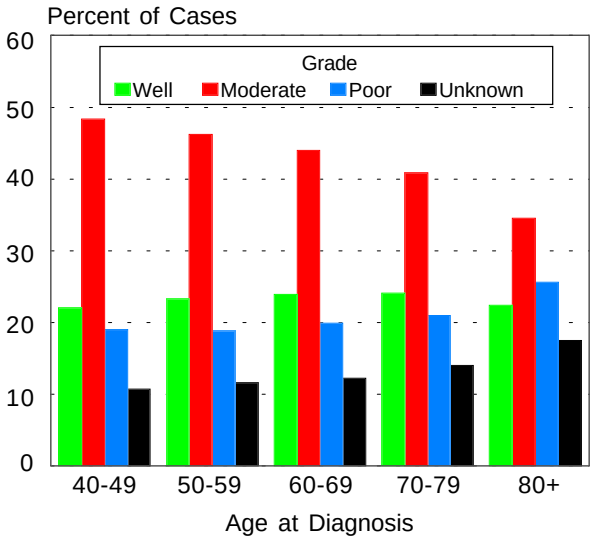


Note: Based on data from the 9 standard SEER registries.

Although most men were diagnosed at a localized stage of disease, the distribution of stage was markedly different among men with different grade tumors (Figure 3.5). More than 80% of men with well differentiated tumors were diagnosed with localized disease. In contrast, only 42% of men with poorly or undifferentiated tumors had localized disease. As the degree of differentiation decreased, the proportion of tumors diagnosed at a regional or distant stage increased.

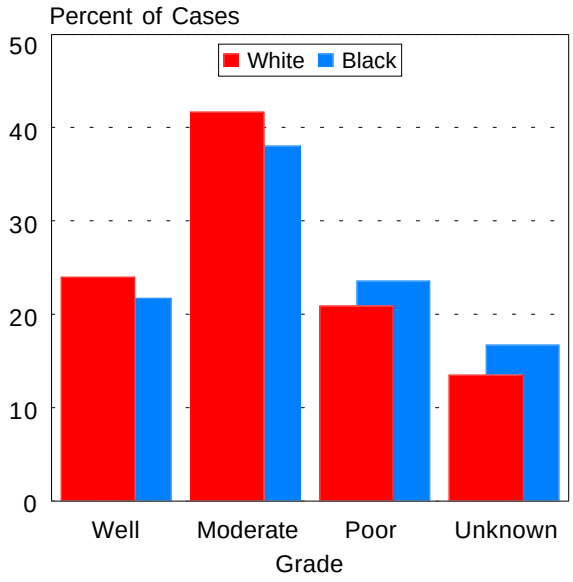
The rise in incidence rates for prostate cancer following the introduction of PSA for screening consisted primarily of an increase in the rate of moderately differentiated cancers (Figure 3.6). The incidence of well differentiated and poorly differentiated cancers also increased, but the changes were smaller in magnitude. These trends in grade-specific rates were associated with an increase in the proportion of prostate cancers that were moderately differentiated and a decrease in the proportions that were well differentiated, poorly differentiated and of unknown grade (Figure 3.6). The same pattern of temporal trends in grade-specific rates and proportions was apparent for men less than 65 years of age and men 65 years of age or older (Figure 3.7). The largest increase in incidence rates for both black and white men was in moderately differentiated cancers (Figure 3.8). During recent years, blacks had a larger increase than whites in the incidence of poorly differentiated tumors.

Figure 3.2
Prostate Cancer Cases
Distribution by Grade and Age
SEER Program, 1973-1995



Note: Based on data from the 9 standard SEER registries.

Figure 3.3
Prostate Cancer Cases
Distribution by Race and Grade
SEER Program, 1973-1995

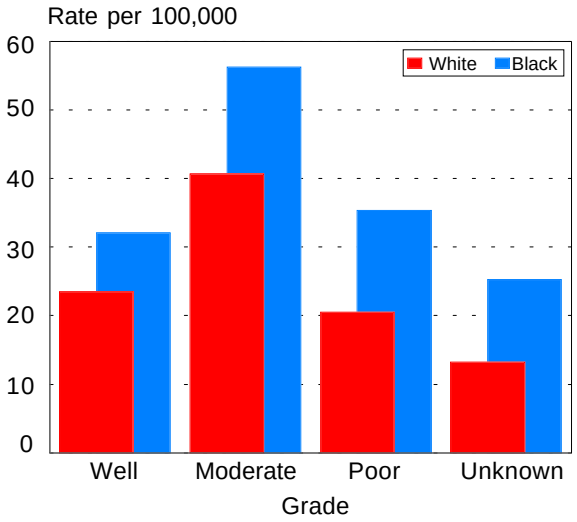


Note: Based on data from the 9 standard SEER registries.

Surgical procedures may also have had some effect upon the temporal trends in tumor grade. The diagnosis and surgical treatment of prostate cancer have changed dramatically since 1983 (Figure 3.9). The incidence rates of prostate cancer treated by radical prostatectomy or diagnosed only by biopsy have increased in whites and blacks. At the same time, the rates of prostate cancer diagnosed or treated by transurethral resection of the prostate (TURP) have decreased in both races. Because these procedures provide different types and amounts of tissue for pathologists to review, these trends may have affected the patterns of prostate cancer by

Figure 3.4

Prostate Cancer Cases
Incidence Rates by Race and Grade
SEER Program, 1973-1995



Note: Rates are age-adjusted to the 1970 U.S. standard population and are based on data from the 9 standard SEER registries.

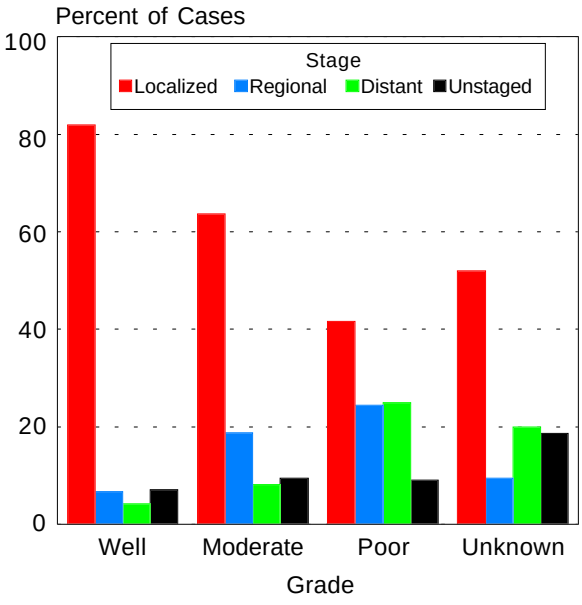
grade. As shown in Figure 3.10, the rates for moderate grade tumors increased in each surgical procedure group (except TURP), suggesting that trends in surgery contribute to, but do not entirely account for, the changes in incidence rates by grade.

The trends in incidence by SEER stage at diagnosis (historic stage) demonstrate that during the PSA screening years, the rate of distant disease fell by 56% (from 14.9 in 1985 to 6.6 per 100,000 in 1995), but there was a steep increase in the rate of localized stage disease (Figure 3.11, Historic Stage). Smaller increases in rates of regional and unstaged disease were observed during 1986-1992. Trends in localized, regional, and unknown stage however, require cautious interpretation. First, the rate of unknown stage disease has been rising in recent years, which may be due to changes in the SEER coding scheme or to a decline in the use of bone scans as clinicians depend more on pre-treatment PSA levels for clinical staging. Second, men undergoing radical prostatectomy are staged on the basis of the surgical pathology report, while non-surgical cases are staged using clinical parameters only. As a result, men with clinically localized prostate cancer who undergo radical prostatectomy may be upstaged to regional disease. One approach to evaluating the effect of this upstaging on trends was to recode radical prostatectomy cases with regional stage disease to clinically localized disease (Figure 3.11, Clinical Stage). (This recoding of the SEER data can only be done for 1983 and later, based on implementation of a more detailed treatment coding scheme in 1983.) As shown, the 1988-1992 increase in regional stage disease (Figure 3.11, Historic Stage) may primarily be explained by the upstaging of prostatectomy cases with clinically localized disease (Figure 3.11, Clinical Stage).

Another approach in dealing with the above problem of interpreting stage data is to examine prostatectomy versus non-prostatectomy cases separately (Figure 3.12). During recent years, the incidence of regional

Figure 3.5

Prostate Cancer Cases
Distribution by Stage and Grade
SEER Program, 1973-1995



Note: Based on data from the 9 standard SEER registries.

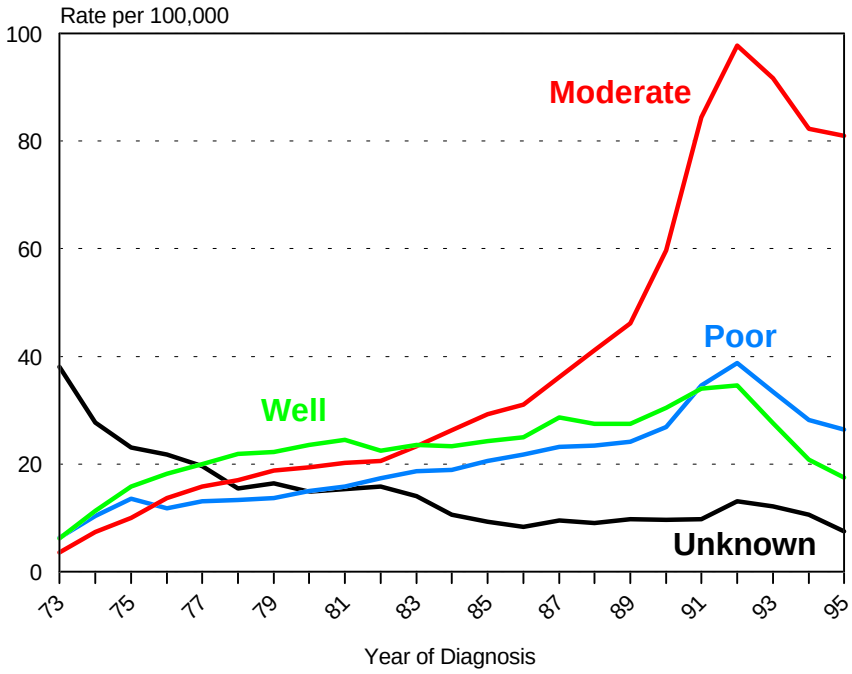
stage disease increased more steeply in radical prostatectomy cases. About 40% of prostatectomy cases are classified as having regional disease compared to only 10% of non-prostatectomy cases.

These trends in prostate cancer stage and grade indicate that the recent epidemic of prostate cancer has been accompanied by a shift toward earlier stage disease at diagnosis, but no shift toward low grade cancer. Rather, there has been a substantial increase in moderately differentiated tumors during the PSA screening years.

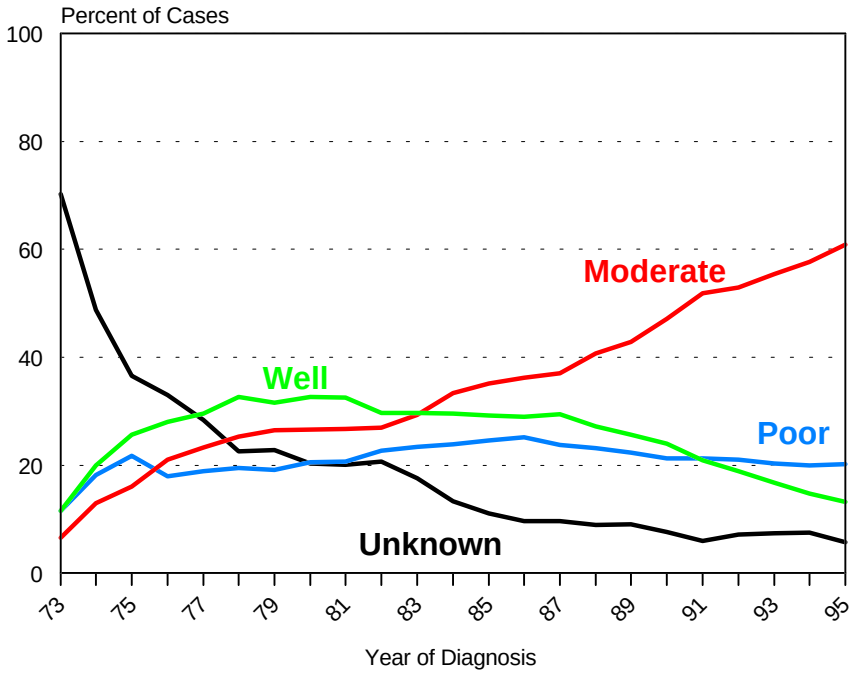
Figure 3.6

Prostate Cancer
SEER Program, 1973-1995

Incidence Rates by Grade



Distribution of Cases by Grade

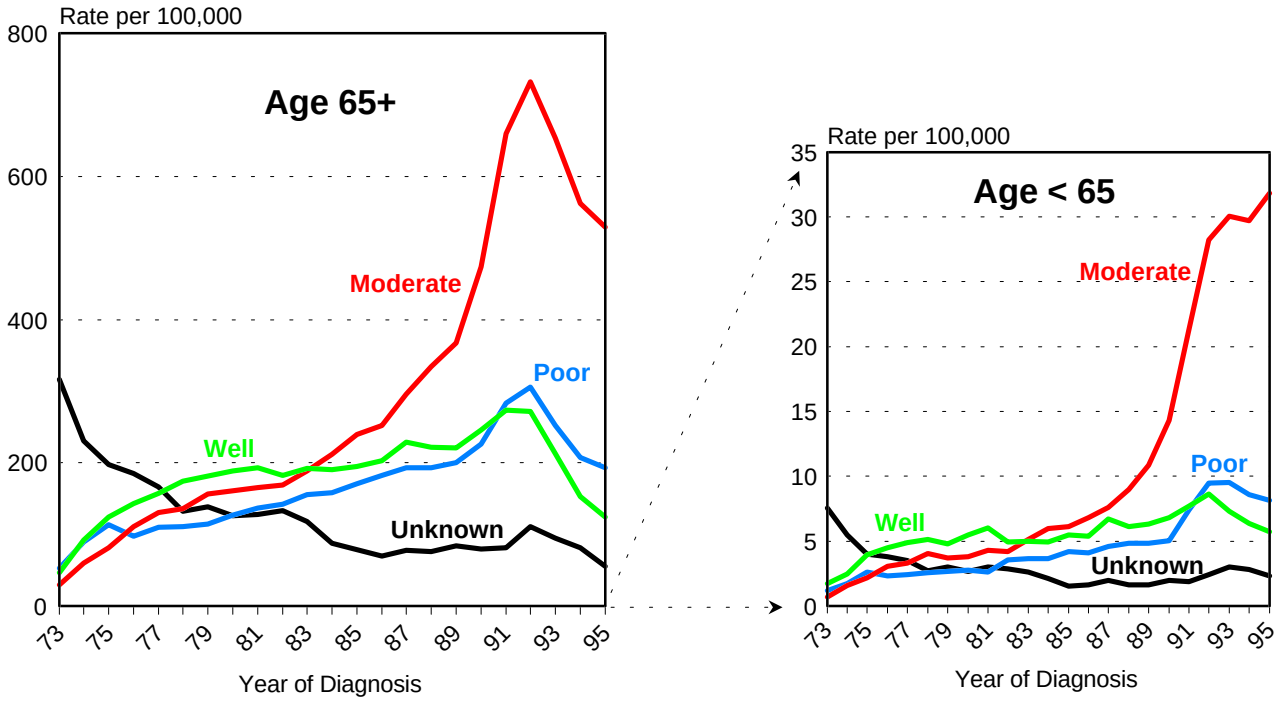


Note: Based on data from the 9 standard SEER registries. Rates are age-adjusted to the 1970 U.S. standard.

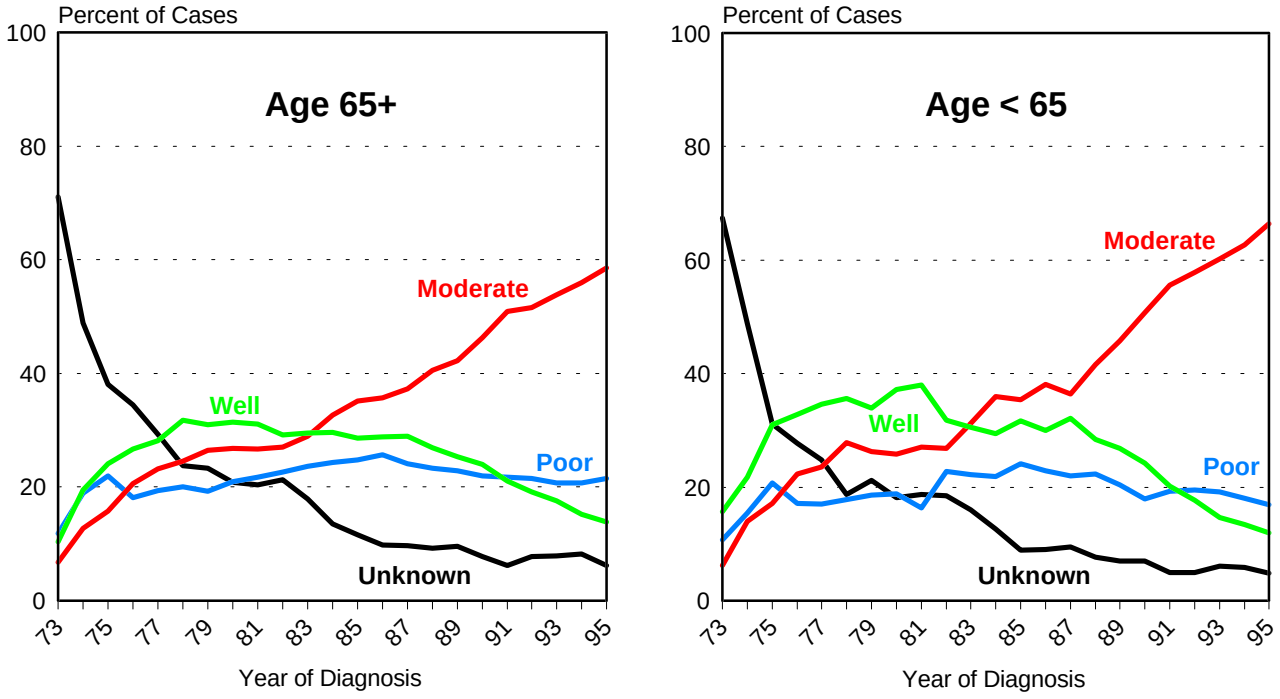
Figure 3.7

Prostate Cancer
SEER Program, 1973-1995

Incidence Rates by Age and Grade



Distribution of Cases by Age and Grade



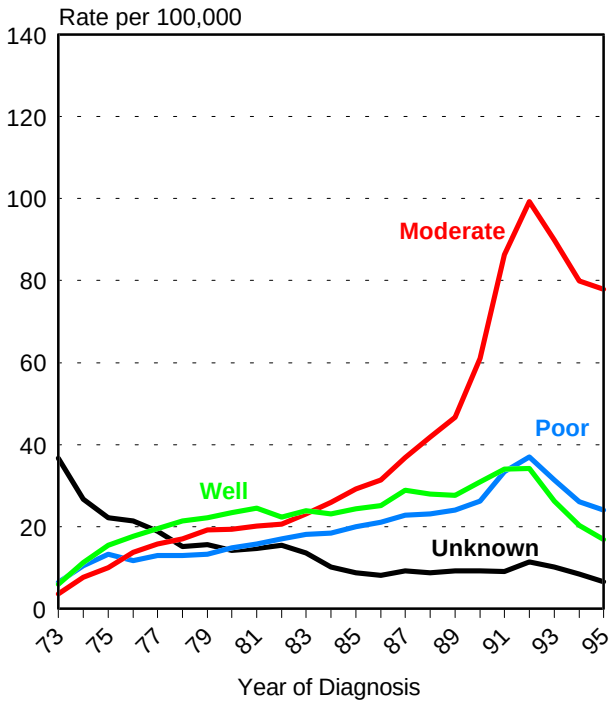
Note: Based on data from the 9 standard SEER registries. Rates are age-adjusted to the 1970 U.S. standard.

Figure 3.8

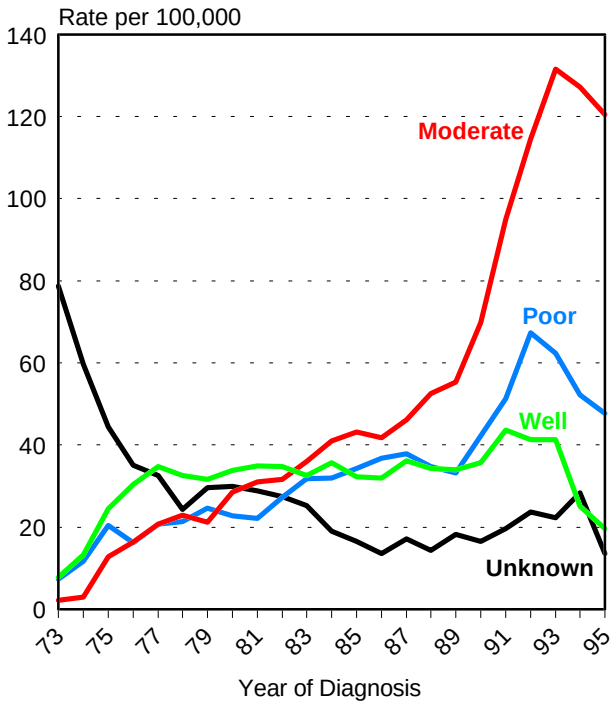
Prostate Cancer
SEER Program, 1973-1995

Incidence Rates by Race and Grade

White

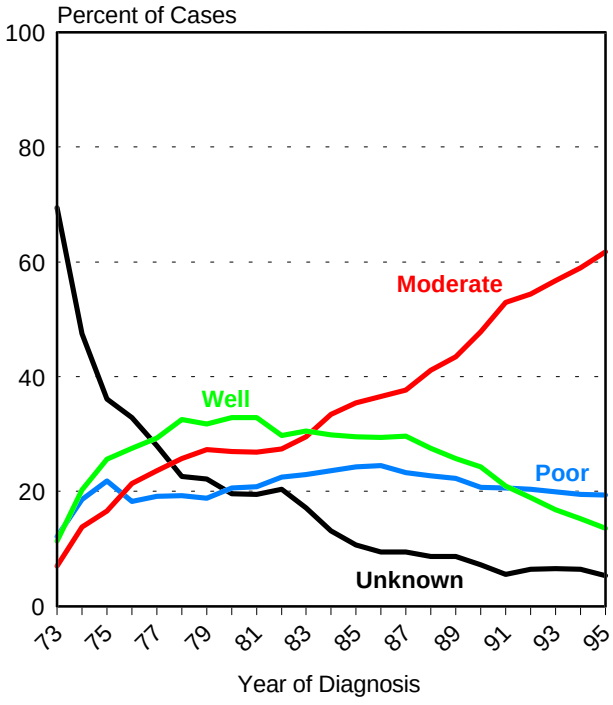


Black



Distribution of Cases by Race and Grade

White



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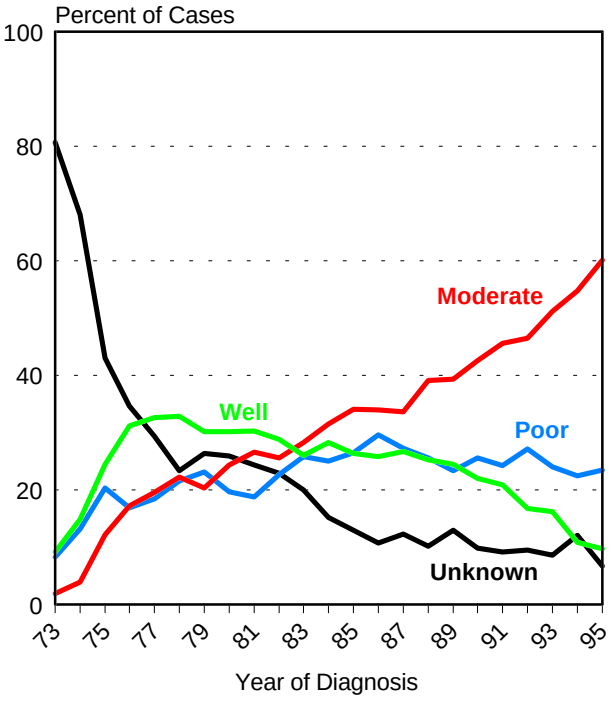
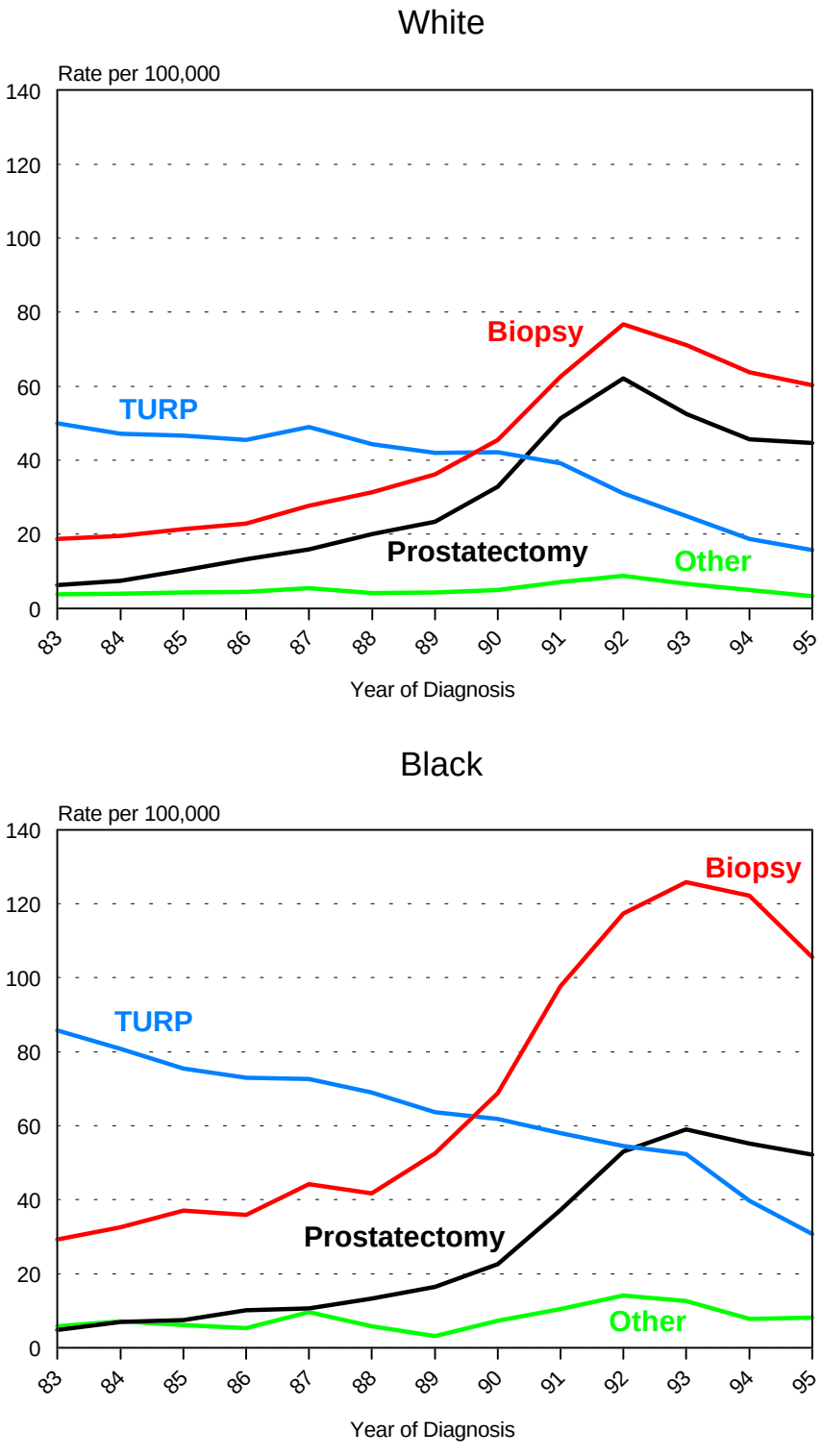


Note: Based on data from the 9 standard SEER registries. Rates are age-adjusted to the 1970 U.S. standard.

Figure 3.9

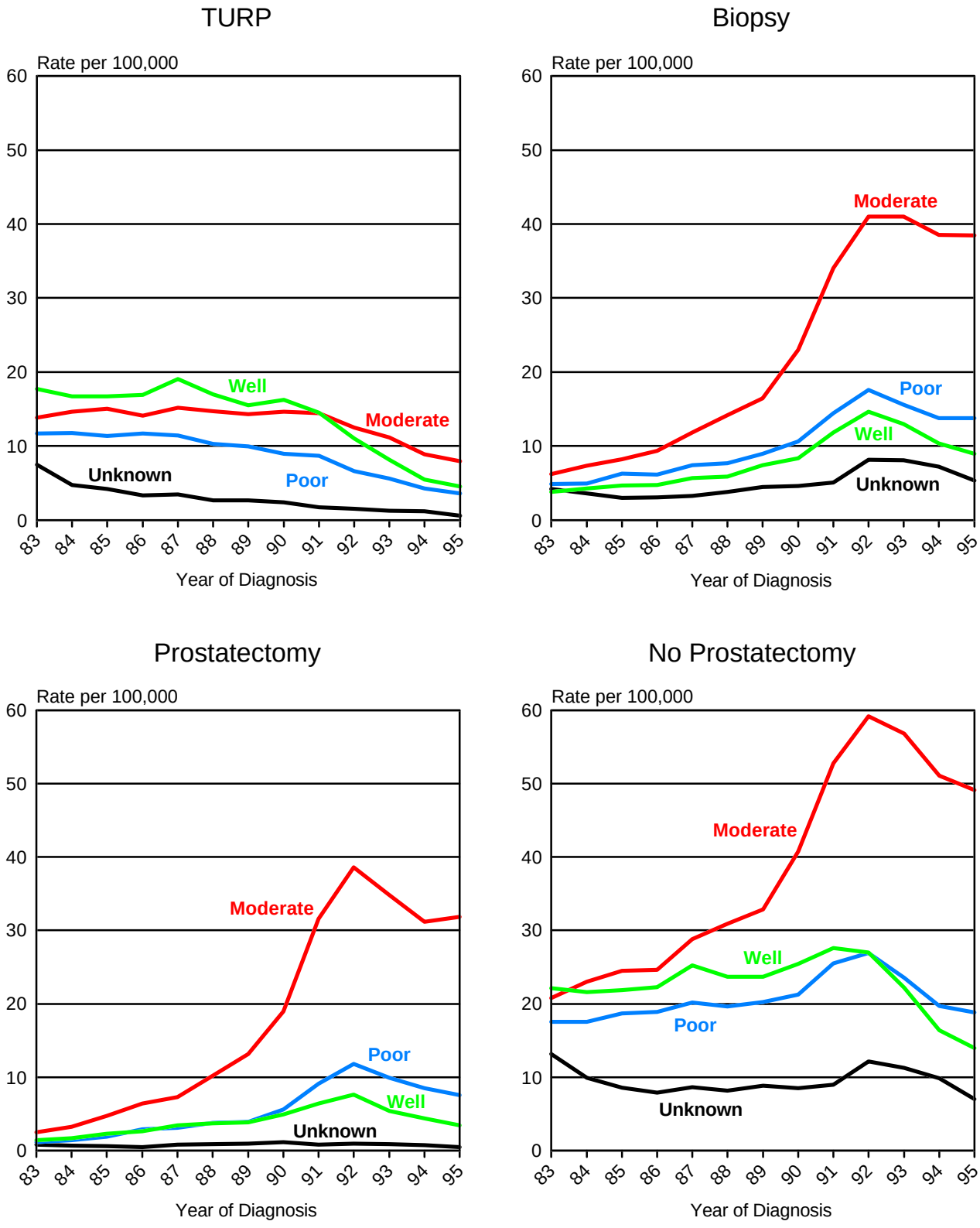
Prostate Cancer
SEER Incidence Rates by Race and Surgical Procedure, 1983-1995



Note: Rates are age-adjusted to the 1970 U.S. standard and are based on data from the 9 standard SEER registries.

Figure 3.10

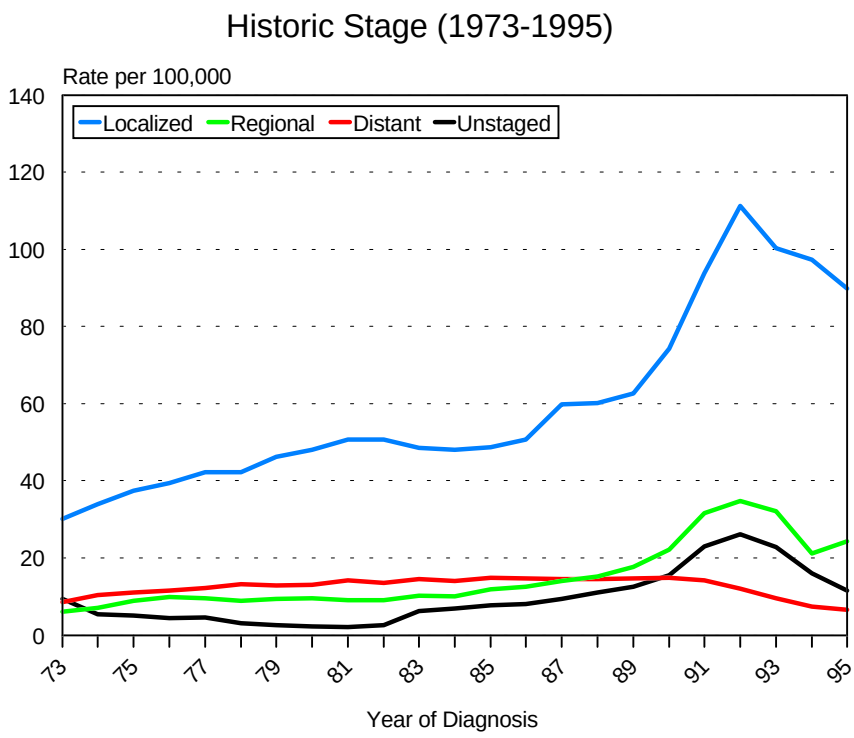
Prostate Cancer
SEER Incidence Rates by Surgical Procedure and Grade, 1983-1995

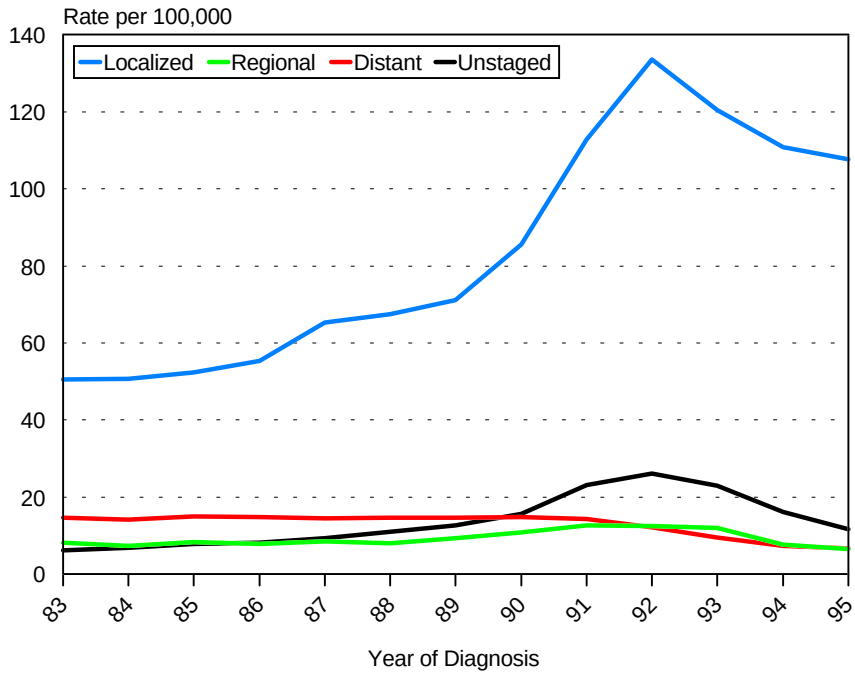


Note: Rates are age-adjusted to the 1970 U.S. standard and are based on data from the 9 standard SEER registries.

Figure 3.11

Prostate Cancer
SEER Incidence Rates by Stage

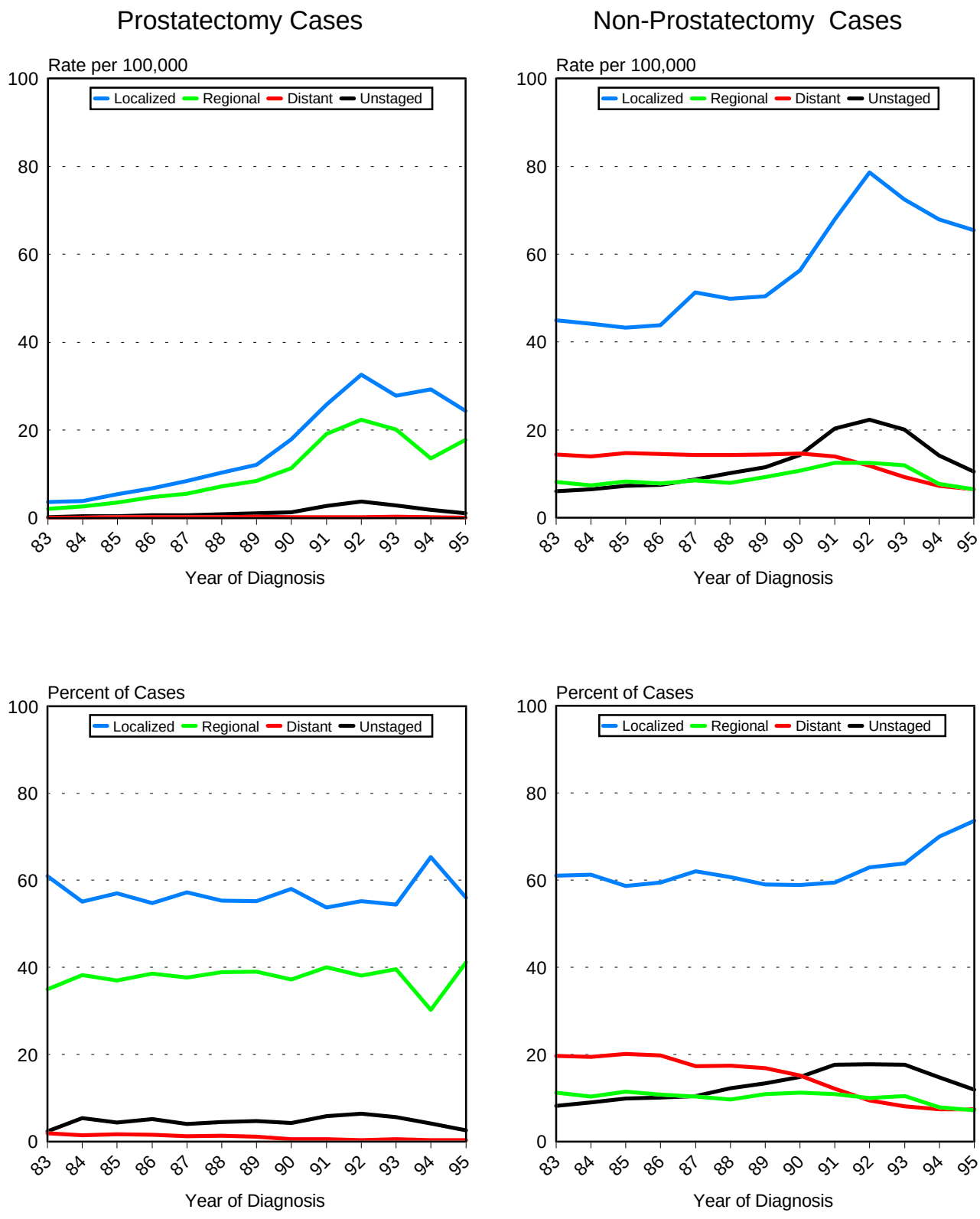




Note: Rates are age-adjusted to the 1970 U.S. standard and are based on data from the 9 standard SEER registries.
*Prostatectomy cases with regional stage disease recoded to localized stage.

Figure 3.12

Prostate Cancer
SEER Incidence by Treatment and Stage, 1983-1995



Note: Based on data from the 9 standard SEER registries. Rates are age-adjusted to the 1970 U.S. standard.