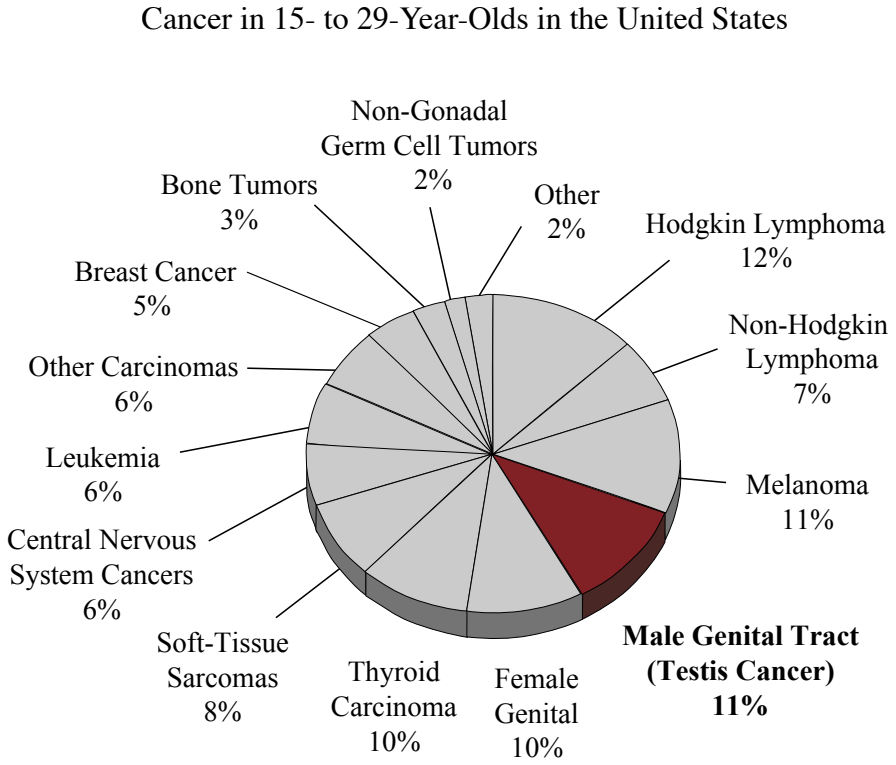
Chapter 13

Male Genital Tract Cancer



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HIGHLIGHTS

Incidence

- Male genital tract or testicular tumors accounted for 21% of all neoplasms in *male* adolescents and young adults from 1975 to 2000, and were the most common solid cancer diagnosis in this age group.
- Testicular cancer accounted for 11% of all cancers occurring in *all* individuals in the 15- to 29-year age group.
- In the year 2000, 2,500 individuals 15 to 29 years old were diagnosed with testicular cancer in the U.S.
- The incidence of testicular cancer peaked in the age ranges 25 to 29 and 30 to 34, and then declined thereafter.
- At its peak, the incidence of testicular cancer was in excess of 120 per year, per million population.
- There were profound racial/ethnic differences in the incidence of testicular cancer. The incidence in white non-Hispanics was 4-fold that in African Americans/blacks.
- Since 1975, the incidence of testicular cancer has increased at an annual rate of 0.97% for individuals aged 15 to 29 years.

Mortality and Survival

- National mortality has decreased from 1975 to 2000 for individuals in all age groups.
- The 5-year survival rate in all age groups was in excess of 90%.
- Testicular cancer survival rates were very histology-specific. The 5-year survival rate varied from 95% for seminoma in 25- to 29-year-olds, to less than 70% for 15- to 19-year-olds with choriocarcinoma or other non-seminomatous histologies.

Risk Factors

- Cryptorchidism is an established risk factor for testicular cancer (a 2.5- to 11-fold increased risk).
- The cause of the vast majority of cases of testicular cancer is unknown.

INTRODUCTION

Almost all male genital tract tumors affecting 15- to 29-year-olds occur in the testis (Figure 13.1). From 1975 to 2000, testicular tumors accounted for 21.4% of all neoplasms in male adolescents and young adults in the U.S., and were the most common solid tumors in males in this age group.[1-8] This is in contrast to children 0 to 14 years of age, in whom testicular tumors accounted for only 2% of all neoplasms, and to individuals 30 to 44 years of age in whom testicular tumors accounted for 7% of all neoplasms. In the U.S., 2,500 adolescents and young adults 15 to 29 years of age were diagnosed with testicular cancer in the year 2000 (Table 13.1).

METHODS, CLASSIFICATION SYSTEM, AND BIOLOGICAL IMPLICATIONS

In the International Classification of Childhood Cancer

Table 13.1: *Incidence of Male Genital Tract Cancer in Persons Younger Than 30 Years of Age, U.S., 1975-2000*

AGE AT DIAGNOSIS (YEARS)	<5	5-9	10-14	15-19	20-24	25-29
U.S. population, year 2000 census (in millions)	9.587	10.274	10.264	10.109	9.482	9.690
Average incidence per million, 1975-2000, SEER	7.8	3.9	4.7	28.3	82.4	117.7
Average annual % change in incidence, 1975-2000, SEER	-0.4%	^	^	1.5%	0.5%	1.6%
Estimated incidence per million, year 2000, U.S.	4.4	3.9	4.7	32.6	87.1	136.5
Estimated number of persons diagnosed, year 2000, U.S.	42	40	48	329	826	1,323

^ Too few for a reliable estimate

(ICCC), malignant germ cell tumors are described in category IX as *Germ-Cell, Trophoblastic and other Gonadal Neoplasms*. Within this classification, there is no distinction between those germ cell tumors that occur in males versus those that develop in females. (The ICCC group also includes intracranial and intraspinal germ-cell tumors [category IX(a)].) Hence for male genital tract tumors, the ICCC was not used and the analysis is based on the topography and morphology information from the International Classification of Diseases for Oncology (ICD-O). Almost all of the cancers of the male genital tract in 15- to 29-year-olds are in the testis, and therefore this chapter is limited to testicular cancer.

The male genital tract includes the tract and associated glands within the testis and prostate. The tract begins in the seminiferous tubules of the testis and ends at the ampulla and ejaculatory duct of the vas deferens. Within the ICD-O, the topographic sites of the male genital tract are the testis (C62.0-C62.1, C62.9), epididymus (C63.0), spermatic cord (C63.1), scrotum (C63.2), seminal vesicle (C63.7), tunica vaginalis (C63.7), overlapping lesions and those not otherwise specified (NOS) (C63.8-C63.9), the prostate (C61.9), and penis (C60.0-C60.9). The ICD-O categories include carcinomas and adenocarcinomas (8010-8041, 8140, many others), malignant Leydig and Sertoli cell tumors (8640-8650, 8631), androblastoma (8630), and germ-cell neoplasms. The latter span categories 9060 to 9085 and include seminoma (9061-9063), dysgerminoma (9060), germinoma (9064), embryonal carcinoma (9070), endodermal sinus (yolk sac) tumor (9071), polyembryoma (9072), teratoma/teratocarcinoma (9080-83), and mixed germ cell tumor (9085).

Since 15- to 29-year-old males rarely have malignant tumors in the male genital tract at sites other than the testis, non-testicular primary sites were excluded from the analyses. The vast majority of the testicular neoplasms are seminomas and non-seminomas. This chapter covers the carcinomas, Leydig/Sertoli cell tumors, seminomas, and germ cell cancers of the testis, including embryonal cell, yolk sac, teratoma and mixed histologies.

As explained in the *Methods* chapter, data are presented for 15- to 29-year-olds with comparisons to the age groups 0 to 15 years and 30 to 44+ years, as appropriate.

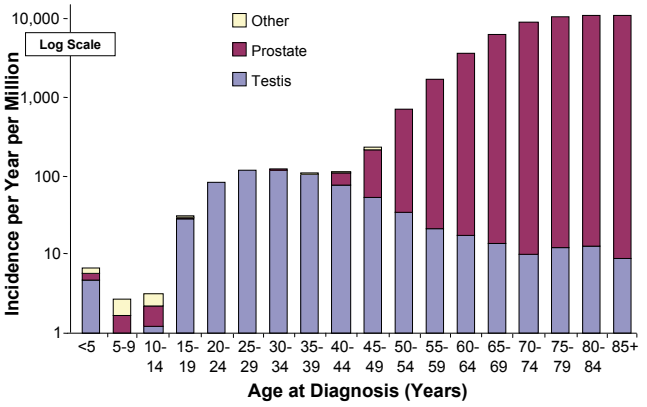

Figure 13.1: Incidence of Genital Tract Cancers in Males, SEER 1975-2000

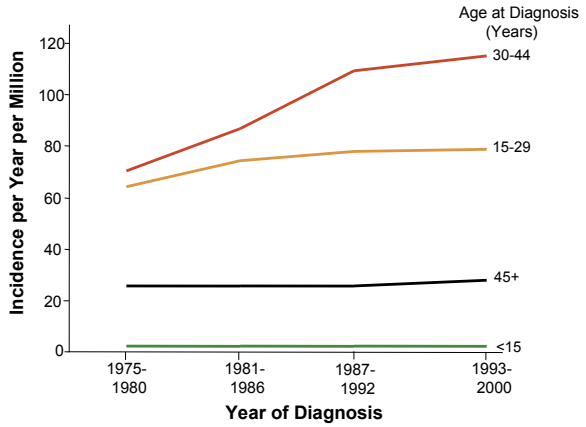

Figure 13.2: Incidence of Testicular Cancer in Males by Era, SEER 1975-2000

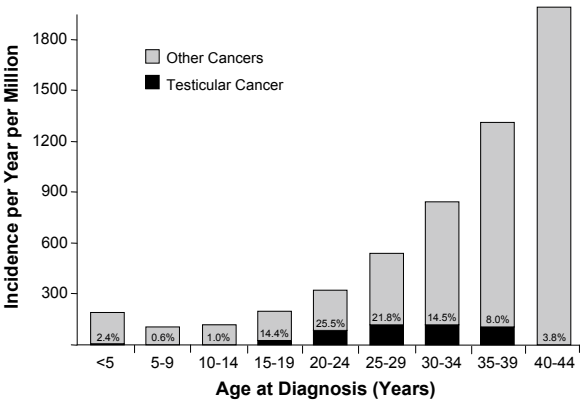

Figure 13.3: Incidence of Testicular Cancer in Males < Age 45 Relative to All Cancers in Males < Age 45, SEER 1975-2000

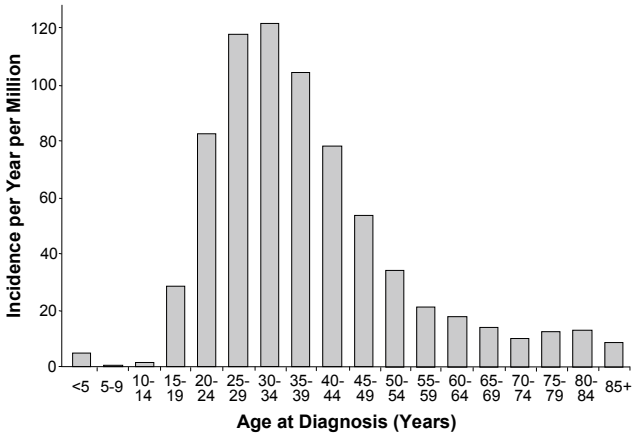

Figure 13.4: Incidence of Testicular Cancer in Males, All Ages, SEER 1975-2000

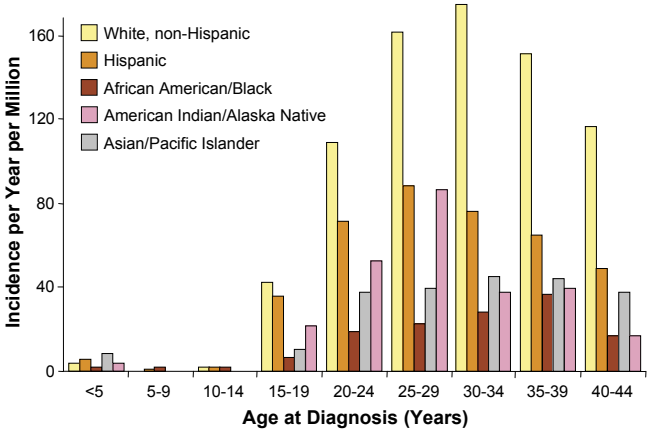

Figure 13.5: Incidence of Testicular Cancer in Males by Race/Ethnicity, SEER 1990-2000

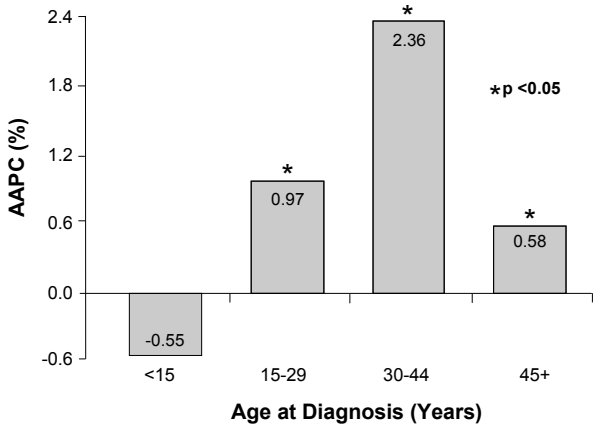

Figure 13.6: Average Annual Percent Change (AAPC) in Incidence for Testicular Cancer in Males, SEER 1975-2000

For some analyses the entire age range from birth to 85+ years is included. The absence of data in any figure or table within this chapter means that too few cases were available for analysis; it does not mean that the rate or change in rate was zero.

Since the ICCC was set up as a classification for childhood cancer, it does not have a separate category for testicular cancer alone. Topography and histology from ICD-O can be used to examine differences among very young testicular cancer patients compared to older patients, but it does not capture the molecular biology of testicular cancer. Males aged 15 to 29 are at a transition point from pediatric to adult biologic characteristics of testicular neoplasms. For example, the isochromosome of the short arm of chromosome 12, i(12p) is a specific genetic marker of all histologies of germ cell tumor in adults. This marker is rarely found in children or young adolescents with germ cell cancer.

INCIDENCE

The incidence of testicular cancer rose slowly in the 15- to 29-year age group during the observation period 1975 to 2000 (Figure 13.2). By comparison, there was a substantial increase in incidence for individuals 30 to 44 years of age.

Age-Specific Incidence

The incidence of testicular cancer as a function of age at diagnosis over the period 1975 to 2000 is presented in Figure 13.3. Relative to other tumors, the proportion of testicular cancers increased from 1% of all cancers in 10- to 14-year-old individuals to 21.8% of cancers diagnosed in the 25- to 29-year age group. There was an increase in all tumors combined in this older group, but the main contribution for the increase was the greater number of testicular cancers diagnosed (Figure 13.4). The incidence of testicular cancer peaked in the 25- to 29- and 30- to 34-year age groups, then decreased in successive 5-year age groups. At its peak, the annual incidence of testicular cancer exceeded 120 per million males.

Racial/Ethnic Differences in Incidence

At all adolescent and adult ages, the incidence of testicular cancer was highest in non-Hispanic whites and lowest in African Americans/blacks (Figure 13.5). Between 25 and 45 years of age, the incidence in non-Hispanic whites was more that 2-fold greater than in all other race/ethnicity groups.

Trends in Incidence

Figure 13.2 displays the trend in testicular cancer incidence by age group. The average annual percent change (AAPC) in incidence is portrayed in Figure 13.6. There were significant increases in the AAPC in incidence for all age groups above age 15. Change in incidence from 1975 to 2000, by age group, is depicted in Figure 13.7.

OUTCOME

Mortality

Trends in mortality data for U.S. males from 1975 to 2000 are shown in Figure 13.8. Over the entire interval of 1975 to 2000, men diagnosed with testicular carcinoma in the 15- to 29-year age group had an average percent reduction in cancer mortality of 6.04% (Figure 13.8, left panel). During the last 9 years of this interval, from 1992 to 2000, the average reduction rate declined to 3.97% per year (Figure 13.8, right panel). The AAPC in mortality for men in the 30- to 44-year age group was -2.46% for the period 1975 to 2000, changing to 0.15% for the more recent period, indicating that 15- to 29-year-olds had a greater rate of mortality reduction. In contrast to younger men, those diagnosed with testis cancer after age 45 had a significant acceleration in mortality reduction over the same intervals, with an AAPC of 0.27% from 1975 to 2000 and an AAPC of -3.38% in the period 1992 to 2000. Since the incidence of testicular cancer in older men increased at a statistically significant, average rate of 0.58 % per year (Figure 13.6), the decline in mortality in this age group is all the more impressive. The likely explanation is that advances in testicular cancer therapy pioneered in young men have subsequently been successfully applied to older men.

Racial/Ethnic Differences in Mortality

U.S. national testicular cancer mortality data for race/ethnicity are depicted in Figure 13.9. The number of evaluable Asians/Pacific Islanders and American Indians/Alaska Natives were too low to reliably include in racial/ethnicity comparisons. Non-Hispanic whites had the highest testis cancer mortality among those above age 25, in part due to the higher incidence in this racial group (Figure 13.5). African Americans/blacks had a lower testis cancer death rate in comparison to both non-Hispanic whites and Hispanics (Figure 13.5). When compared directly to the

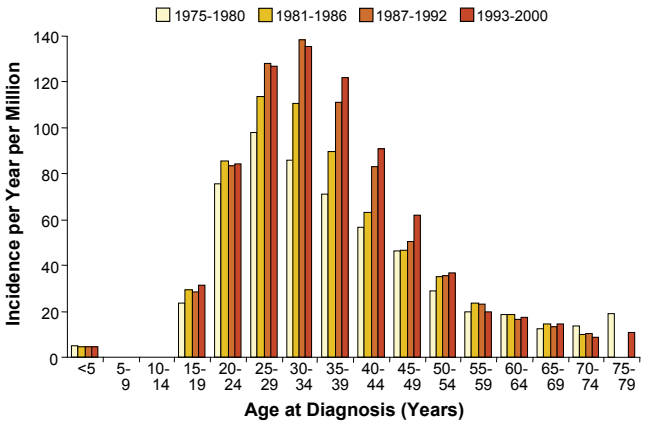

Figure 13.7: Change in Incidence for Testicular Cancer in Males by Era, SEER

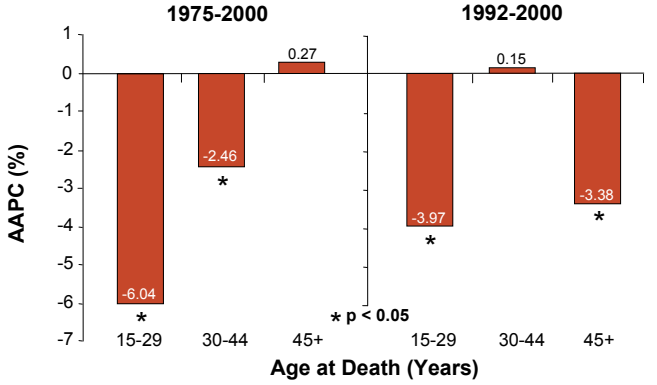

Figure 13.8: Average Annual Percent Change (AAPC) in Testicular Cancer Mortality for Males, SEER 1975-2000

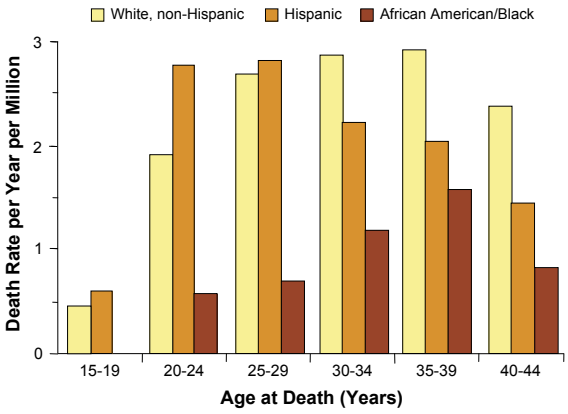

Figure 13.9: Testicular Cancer Mortality in Males by Race/Ethnicity, U.S., SEER 1975-2000

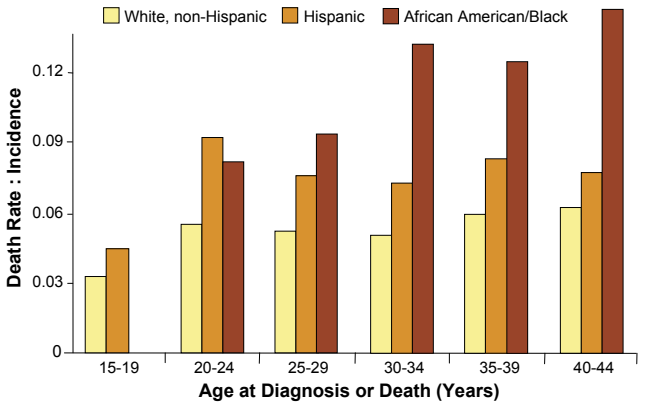

Figure 13.10: Ratio of National Death Rate to SEER Incidence by Race/Ethnicity, Testis Cancer in Males, 1975-2000

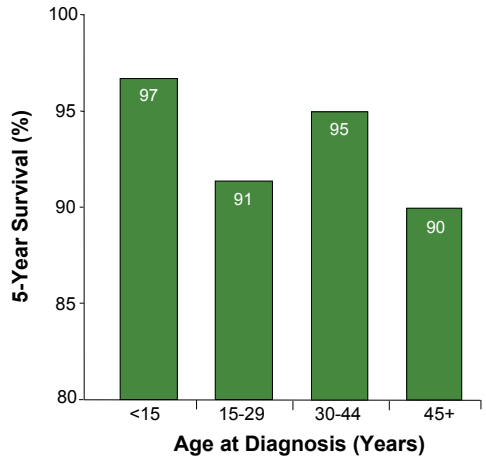

Figure 13.11: 5-Year Survival Rate for Testicular Cancer in Males, SEER 1975-1999

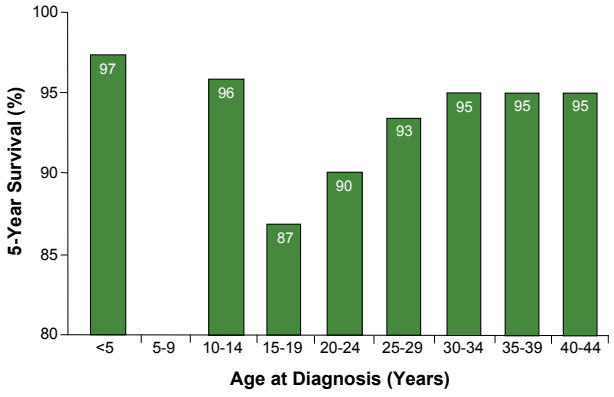

Figure 13.12: 5-Year Survival Rate for Testicular Cancer in Males, SEER 1975-1999

incidence pattern, however, African Americans/blacks 25 years of age and older had higher testis cancer mortality than either of the other races/ethnicities (Figure 13.10). The worse prognosis for young African Americans/blacks with cancer is consistent with several other cancers reviewed in this monograph, and is likely attributable to a variety of factors, including delayed diagnosis, differences in access to care and other social inequities, and possible biologic differences in the cancer and host responses to therapy.

Survival

The survival of patients with testicular cancer has improved substantially from 1975 to 2000. This is due primarily to improvements in chemotherapy and to the education of oncologists in new treatment approaches. The 5-year survival rates for individuals with testicular cancer from 1975 to 1999 are shown in Figures 13.11 and 13.12. A 5-year survival rate of 91% was observed in the 15- to 29- year age group. When examined by 5-year age intervals (Figure 13.12) the 15- to 19- and 20- to 24-year age groups had the lowest survival rates—87% and 90%, respectively.

The trends in testicular cancer survival during the years 1975 to 2000 are presented in Figures 13.13 and 13.14. All age groups experienced improvements in survival during this observation period. Individuals 15 to 29 and 20 to 24 years of age demonstrated the largest increases in 5-year survival rates from 1975 to 1980 and 1993 to 2000. Furthermore, the relatively poor survival rates for those 15 to 19 and 20 to 24 years of age reflect in large part the results reported from 1975 to 1980 (Figure 13.14).

The histology of testicular cancer had a profound effect on 5-year survival rates (Figure 13.15). This was observed across all three adolescent and young adult 5-year age intervals presented (Figure 13.16), and varied from 66% for non-seminomatous tumors (choriocarcinoma, yolk sac, etc.) in 15- to 19-year-olds, to greater than 95% for 25- to 29-year-old individuals with seminoma.

RISK FACTORS

The SEER Pediatric Monograph on cancer incidence and survival reviewed the data on proven and suspected risk factors for germ cell tumors.[1,9] These risk factors are presented below in modified form as they apply to testicular cancer.

Cryptorchidism is a proven risk factor for testicular cancer. This occurs on both the ipsilateral and contralateral sides, and increases the risk by 2.5- to 11-fold.[1,10,11] Suggestive evidence for testicular cancer etiology has been reported for the following: hernia, trauma, family history of germ cell tumor, and high maternal hormone levels during pregnancy.[1,10,12-14] Factors such as viral infection, parental occupation, x-ray exposure, or genetic chromosomal syndromes such as Klinefelter's have not been shown convincingly to cause testicular cancer.[1,10,15-18] Review of these data on risk factors for testicular cancer suggests that an extremely small minority of these cancers may be attributable to environmental factors, thus the opportunity for prevention of male germ cell cancers is minimal.

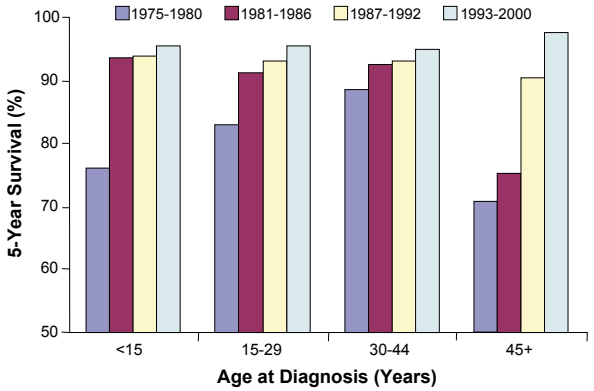

Figure 13.13: 5-Year Survival Rate for Testicular Cancer in Males by Era, SEER

SUMMARY

Testicular cancers, or tumors of the male genital tract, accounted for 21% of all neoplasms diagnosed in males 15 to 29 years of age, and were the most common solid tumors diagnosed in this age group. The incidence of testicular cancer reached its maximum in the age groups 24 to 29 years and 30 to 34 years. At its peak, the incidence of testicular cancer in males exceeded 120 per year per million. In adolescents and young adults, the incidence of testicular cancer has increased in the time period 1975 to 2000.

Testicular cancer mortality for U.S. males aged 15 to 29 years decreased from 1975 to 2000, by an average annual rate of 6%. There have been corresponding increases in 5-year survival rates observed among all age groups.

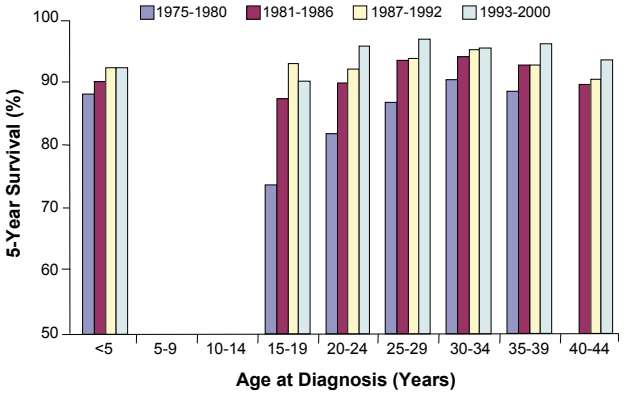

Figure 13.14: 5-Year Survival Rate for Testicular Cancer in Males by Era, SEER

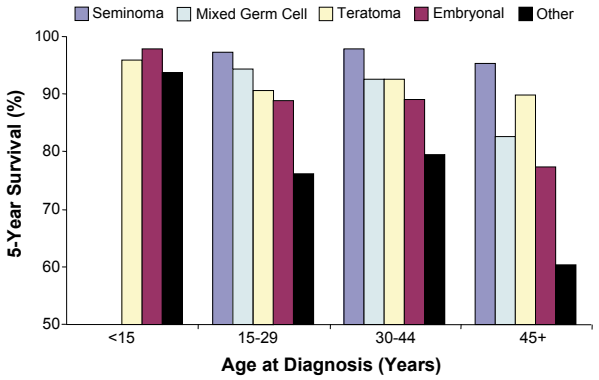

Figure 13.15: 5-Year Survival Rate for Testicular Cancer in Males by Histology, SEER 1975-1999

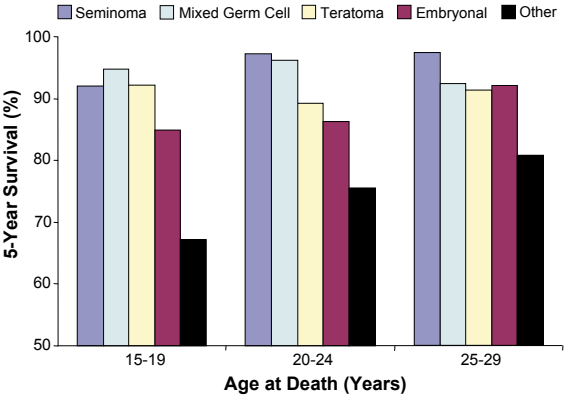

Figure 13.16: 5-Year Survival Rate for Testicular Cancer in Males by Histology, SEER 1975-1999

The survival from testicular cancer was histology specific, ranging from 90-95% survival for seminoma to 60-80% survival for choriocarcinoma and others.

Epidemiologic studies have demonstrated that cryptorchidism is the only proven risk factor for testicular cancer. Other factors and environmental exposures have been suggested but have not been consistently associated with an increased risk of testicular cancer.

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