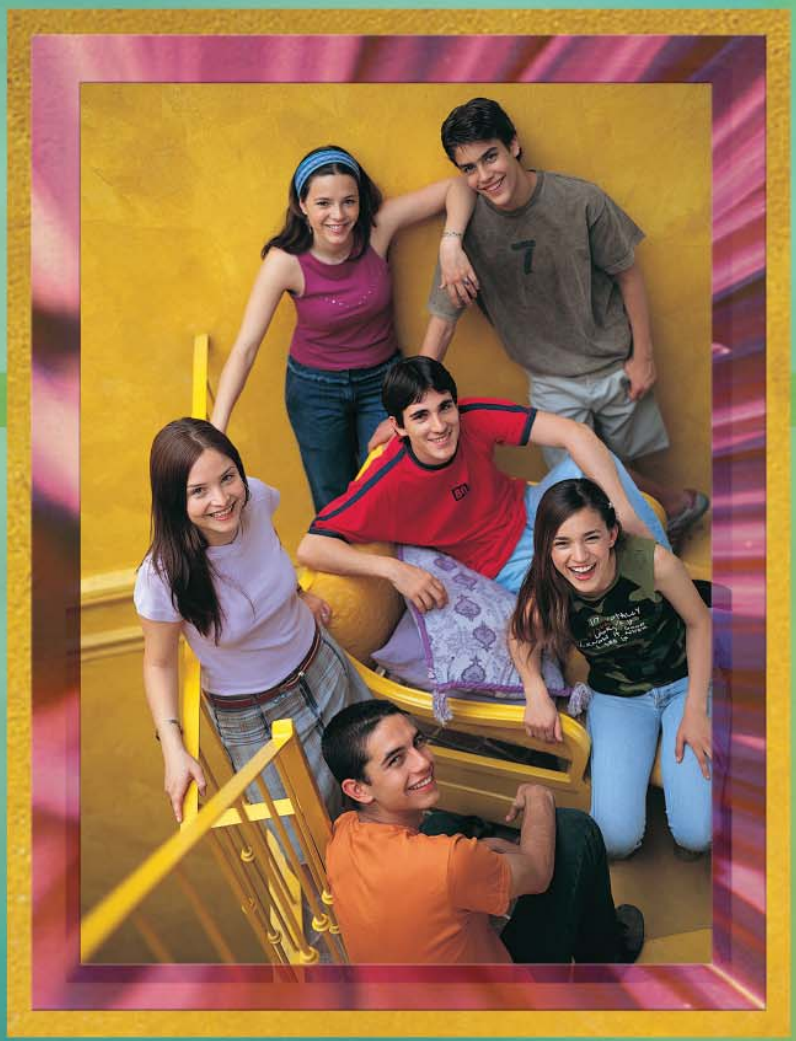
Childhood Cancer in California 1988 to 1999 Volume II: Adolescents Ages 15 to 19



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CCR
California Cancer Registry

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Childhood Cancer in California 1988 to 1999 Volume II: Adolescents Ages 15 to 19

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Contents

Adolescent Cancer Incidence in California

Each year in California, over 400 adolescents between the ages of 15 and 19 are initially diagnosed with a primary, malignant cancer. For the most recent six-year period, 1994 to 1999, the average annual age-specific rate (AASR) was 20.44 new cases per 100,000. In combination with the average 1,000 new malignancies diagnosed annually in children and younger teenagers under age 15, the overall age-adjusted incidence in California residents under age 20 was 15.30 cases per 100,000 (Table 1).

Table 1
Average Annual Age-Specific (Ages 15 to 19) and Age-Adjusted Cancer Incidence for all sites combined in California Children and Adolescents (Ages Birth to 19) by Age Group, Sex, and Race/Ethnicity (1994-1999)

		15-19 Years			Birth-19 Years		
		Cases	ASIR	SE	Cases	AAIR	SE
All Races Combined	Male	1,450	21.86	0.57	4,991	16.25	0.23
	Female	1,183	18.92	0.55	4,157	14.29	0.22
	Total	2,633	20.44	0.40	9,148	15.30	0.16
Non-Hispanic White	Male	677	22.51	0.87	2,133	16.77	0.36
	Female	559	19.94	0.84	1,767	14.78	0.35
	Total	1,236	21.27	0.61	3,900	15.80	0.25
Black	Male	89	16.74	1.77	300	12.88	0.75
	Female	82	16.33	1.80	268	11.95	0.73
	Total	171	16.54	1.26	568	12.42	0.52
Hispanic	Male	515	22.71	1.00	2,026	16.87	0.39
	Female	400	18.51	0.93	1,655	14.46	0.37
	Total	915	20.66	0.68	3,681	15.69	0.27
Asian-Pacific Islander	Male	131	16.80	1.47	436	12.73	0.61
	Female	112	15.09	1.43	388	11.94	0.61
	Total	243	15.97	1.02	824	12.34	0.43

Cases=Number of new primary malignant cases initially diagnosed between January 1994 and December 1999, reported to CCR as of August 2001.
Age-specific incidence rate (ASIR)=Average annual age-specific incidence for the six-year period, 1994-1999, reported as cases per 100,000.
Age-adjusted incidence rate (AAIR)=Average annual age-adjusted incidence for the six-year period, 1994-1999, reported as cases per 100,000, adjusted to the 2000 U.S. Standard.
SE=Standard error for the ASIR or AAIR.
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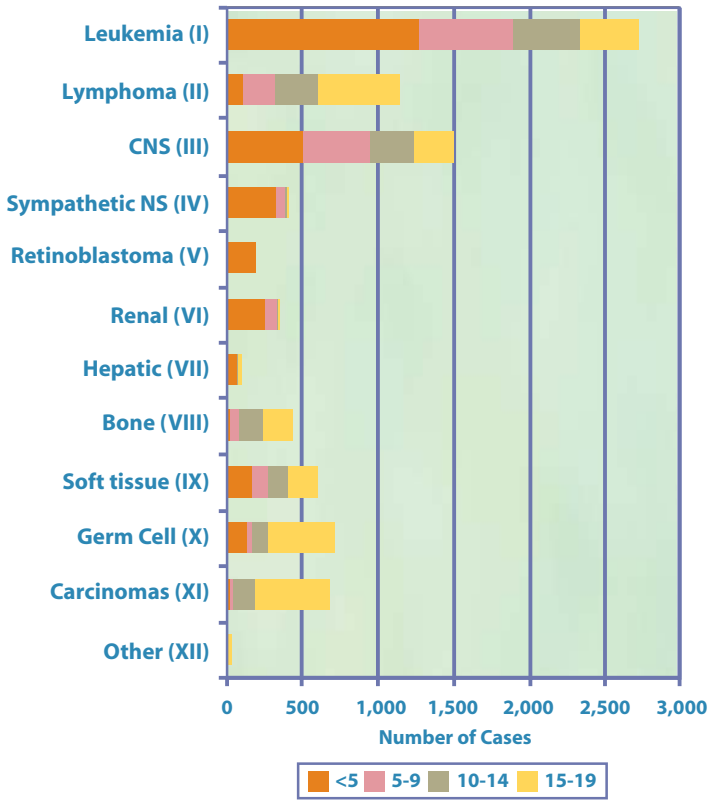
Figure 1
Number of Cases of Childhood and Adolescent Cancers by Major ICCC Category and Five-Year Age Group, All Races and Both Sexes Combined (1994-1999)



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Tumors that occur in adolescence differ substantially from the types usually diagnosed in younger children or adults. In contrast to the common embryonal cancers observed during early childhood, including neuroblastoma, retinoblastoma, Wilms' tumor, hepato-blastoma, and certain central nervous malignancies, adolescents have higher rates of lymphoma, particularly Hodgkin's, germ cell malignancies, soft tissue and bone cancers (Figure 1). Leukemias, specifically acute leukemias, remain a common malignancy among all children and adolescents. Reporting and description of cancer incidence in older teenagers, ages 15 to 19, has been inconsistently combined with discussion of childhood cancer.[1-4] However, the patterns of cancer occurrence, both in the quantity and type of malignancies, in this age group vary substantially enough relative to younger children to warrant separate review.

Since 1988, a total of 5,058 new malignancies have been diagnosed in Californians ages 15 to 19, with the overall adolescent cancer rate increasing slightly, with a statistically nonsignificant upward average annual increase in age-specific rates (estimated annual percent change (EAPC) 1.0 p=0.47). By comparison, the National Cancer Institute (NCI), SEER estimates that from 1973 to 1999, the age-specific incidence rate (ASIR) for all cancers combined

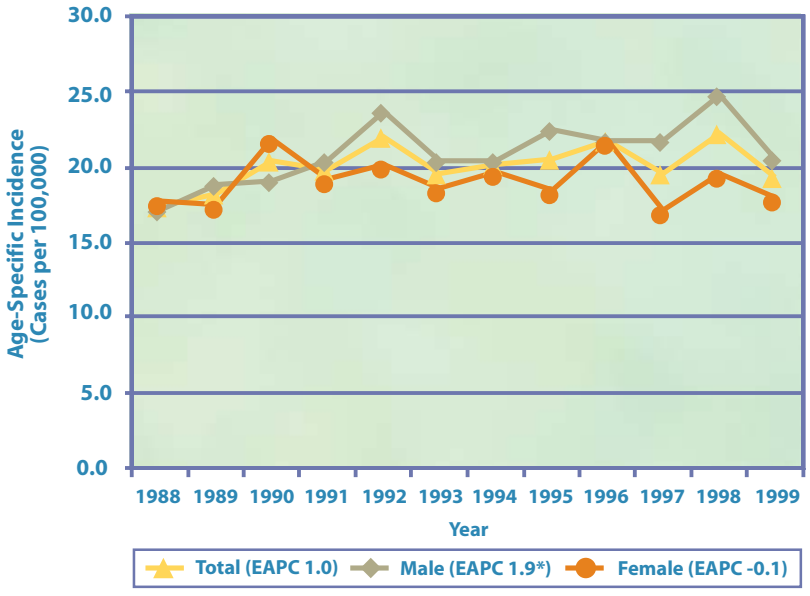
increased significantly in adolescents (EAPC 0.6 p<0.05); however, this trend reversed in the most recent period, 1987 to 1999, with age-specific rates declining (EAPC -0.3 p<0.05).[4]

Although this report focuses on the age-specific cancer incidence patterns in adolescents ages 15 to 19, it also summarizes the age-adjusted cancer incidence in California's children and adolescents, based on the 17,780 invasive, primary cancer cases diagnosed among residents under age 20 initially diagnosed from January 1, 1988, through December 31, 1999, and reported to CCR as of August 2001. More specific information on patterns of cancer occurrence in children under age 15 may be found in the companion report Childhood Cancer in California 1988 to 1999 Volume I: Birth to Age 14 (April 2003).

Overall Cancer Trends

The age-specific incidence of cancer among 15 to 19 year olds increased slightly in California over the 12-year period 1988 to 1999. Since the onset of statewide cancer surveillance in 1988, cancer rates in this age group have averaged a statistically nonsignificant 1.0 percent average annual increase (p=0.47), increasing a total of 14.0 percent (Figure 2). This age-specific increase in incidence for all cancer sites combined was instigated by a

Figure 2
Annual Age-Specific Cancer Incidence Among California Adolescents, Ages 15 to 19, by Sex, All Races Combined (1988-1999)



*Statistically significant p<0.05
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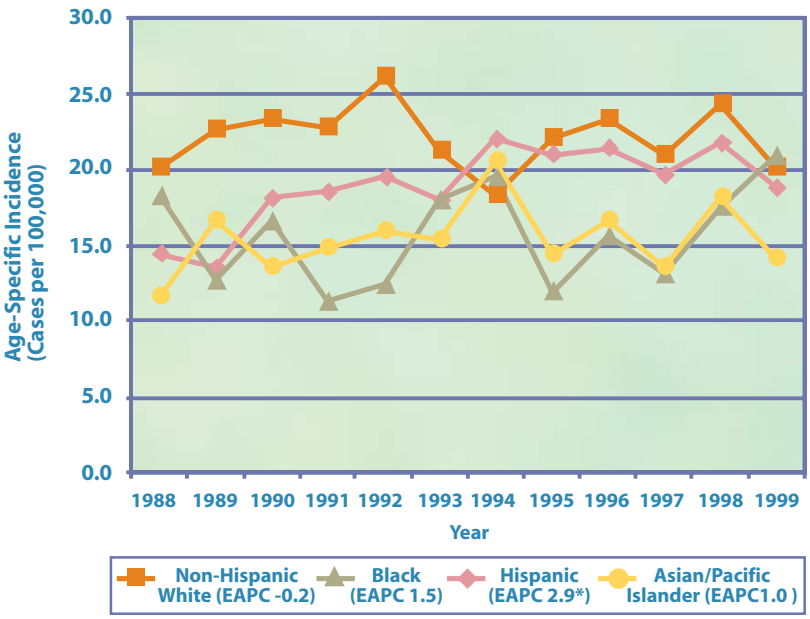
statistically significant 26.2 percent total rise among adolescent males (EAPC 1.9 p=0.02), in comparison to a slight, statistically nonsignificant decline for females (EAPC -0.1 p=0.93). Among 15 to 19 year olds, changes in race-specific trends were greatest for Hispanics, a total of 45.5 percent, for an average annual percent increase of 2.9 percent (p=0.01), driven by larger, statistically significant increases in Hispanic males, 65.7 percent total change (EAPC 4.5 p=0.001), and to a lesser degree in Hispanic females, 24.7 percent total change (EAPC 1.0 p=0.41). No statistically significant overall cancer trends were observed in adolescent non-Hispanic whites (EAPC -0.2 p=0.82), blacks (EAPC 1.5 p=0.40), or Asian/Pacific Islanders (EAPC 1.0 p=0.47) (Figure 3).

In combination with cancer incidence in younger children and teenagers, ages birth to 19, relatively flat, slightly downward trends occurred in both the overall (EAPC -0.3 p=0.23) and sex-specific, age-adjusted rates, males EAPC 0.1 (p=0.80) and females EAPC -0.7 (p=0.03). Race-specific trends in overall age-adjusted cancer incidence have remained relatively stable, with flat or negative trends since 1988 among non-Hispanic whites (EAPC -0.8 p=0.05), blacks (EAPC -0.9 p=0.28), and Asian/Pacific Islanders (EAPC -1.1 p=0.09);

Figure 3
Annual Age-Specific Cancer Incidence Among California Adolescents, Ages 15 to 19, by Race/Ethnicity, Both Sexes Combined (1988-1999)



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however, age-adjusted incidence in Hispanics under age 20 have risen over ten percent during the same time period, approaching statistical significance (EAPC 0.8 p=0.06).

Common Sites

Figure 4 presents the most common invasive cancers diagnosed among 15 to 19 year olds by major international classification of childhood cancer (ICCC) category or subcategory. These cancer categories represent over 94 percent of all primary cancers diagnosed during the 12-year period, 1988 to 1999. In California, as with younger children, common cancers diagnosed in this age group were lymphomas (Hodgkin's disease and non-Hodgkin's lymphomas); malignant tumors of the central nervous system (CNS); germ cell, trophoblastic, and other gonadal malignancies; and leukemia (acute lymphocytic and acute myeloid). However, as will be described in later sections, both the relative frequency and absolute occurrence of these common childhood cancers vary in adolescence compared to early childhood, particularly the increasing proportion of cases attributable to Hogkin's disease, bone tumors (osteosarcoma and Ewing's sarcoma), and certain soft tissue sarcomas (non-rhabdomyosarcomas). Additionally, other cancers begin to arise that

Figure 4
Relative Frequency of Common Cancers (ICCC Category) in California Adolescents Ages 15 to 19 (1994-1999)

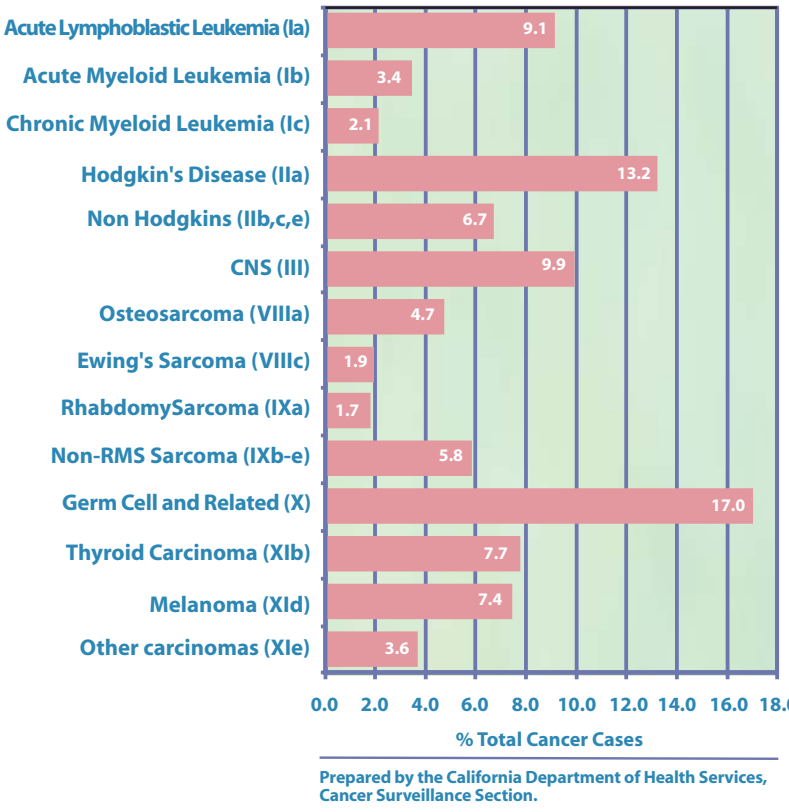

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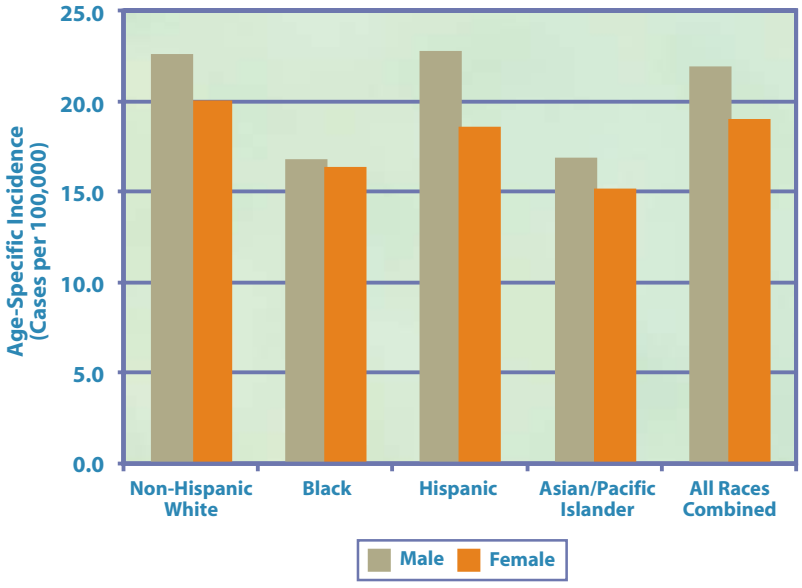
Figure 5
Average Annual Age-Specific Incidence of Cancer in California Adolescents, Ages 15 to 19, by Sex, and Race/Ethnicity (1994-1999)



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rarely occur earlier in life, including carcinomas and other epithelial tumors, such as thyroid carcinoma, malignant melanoma, and gonadal carcinomas.

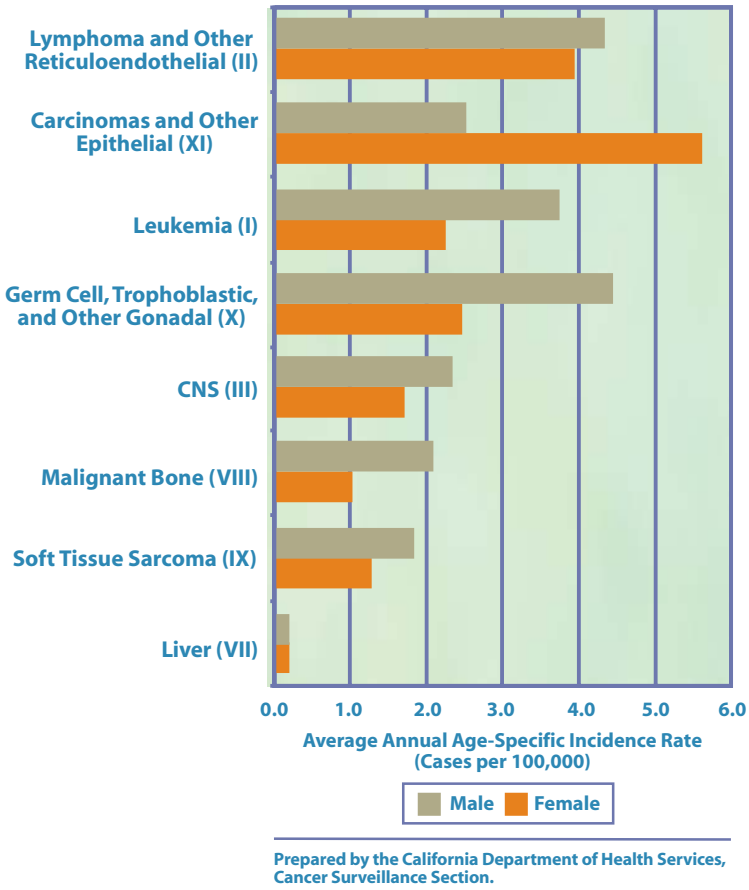
Sex

For all cancer sites combined, cancer occurs slightly more frequently among males than females ages 15 to 19 (Figure 5), with age-specific incidence at 21.86 and 18.92 cases per 100,000, respectively (Table 1). However, within the majority of individual ICCC diagnostic categories cancer incidence varied substantially by sex, with male incidence usually substantially higher. However, as will be discussed in following sections, some specific cancer types (anatomic sites and/or histologies) have a female predominance, the exceptions being rates for renal, germ cell, and epithelial cancers (Figure 6).

Race/Ethnicity

In California, the incidence of childhood cancer varies significantly by race/ethnicity. Among males ages 15 to 19, Hispanics and non-Hispanic whites at 22.71 and 22.51 cases per 100,000, respectively, had the highest overall age-specific cancer incidence, followed by male adolescents identified as black (16.74 cases per 100,000) and Asian/Pacific Islander (16.80 cases per 100,000) (Figure 5). Although accounting for a relatively lower overall cancer incidence, females demonstrated a similar incidence pattern with non-Hispanic whites and Hispanics, having the highest age-specific

Figure 6
Common Cancers in California Adolescents, Ages 15 to 19, by Major ICCC Diagnostic Category and Sex, All Races Combined (1994-1999)



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incidence rates at 19.94 and 18.51 cases per 100,000, respectively, again followed by lower rates in blacks (16.33 cases per 100,000) and Asian/Pacific Islanders (15.09 cases per 100,000) (Table 1).

As detailed in Appendix C, several race-specific incidence rates were based on a small number of cases, especially rates for adolescents classified as black or Asian/Pacific Islander, and should be noted with caution due to the increased volatility in rates based on smaller case numbers.

Technical Notes

This report briefly summarizes the incidence of the major types of cancer diagnosed in California adolescents ages 15 to 19 during the 12-year period, 1988 to 1999. Individual sections are presented for the most commonly occurring cancers as categorized by the ICCC scheme.[5] Each section

describes the California specific cancer incidence including variation by age, sex, and race/ethnicity. Data will be discussed for adolescent specific incidence rates, as well as overall rates among children and adolescents combined, ages birth to 19. More specific information on patterns of cancer occurrence in children under age 15 may be found in the companion report Childhood Cancer in California 1988 to 1999 Volume I: Birth to Age 14.[6] The appendices include summarized tabulations of the frequencies of various types of cancer incidence by sex and race/ethnicity.

Reporting of all newly diagnosed cancers in California has been legislatively mandated since 1985, with statewide population-based reporting fully implemented by January 1988.[7,8] A "case" is defined as a primary cancer, as distinguished from cancer spread from another site or surrounding tissue. All reported cancers are invasive, e.g., have infiltrated the surrounding tissue or basement membrane.[7,8] Data in this report cover the years 1988 through 1999, representing the time since population-based cancer reporting was initiated statewide, and reported to CCR as of August 2001. Only cases diagnosed among state residents are included in this report.

Malignancies in this report are classified according to the ICCC scheme (Appendix A). The ICCC system classifies cancer into one of twelve major diagnostic groups.[6] Each of these categories are further refined into 48 diagnostic subgroups based on tumor histology and anatomic site. Detailed summary tables of cancer incidence by age, sex, and race/ethnicity are presented in Appendices B and C for the major ICCC categories and selected subgroups.

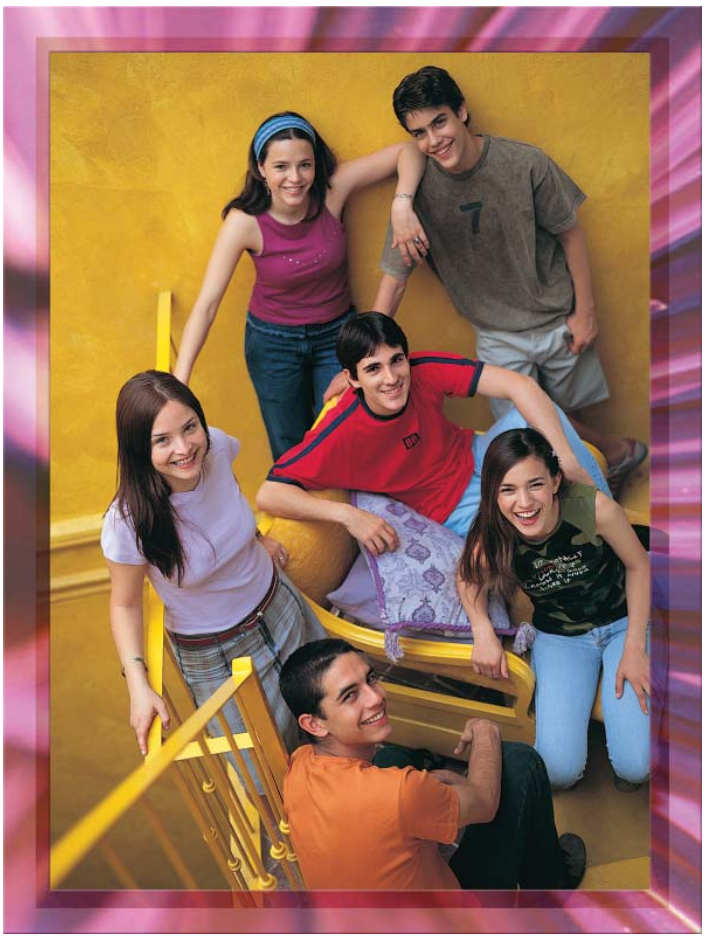
Annual mid-year population estimates by age, race/ethnicity, and sex were obtained from the California Department of Finance (DOF) Demographic Research Unit.[9-11] Race/ethnicity is grouped into mutually exclusive categories of non-Hispanic white, black, Hispanic, and Asian/Pacific Islander. Although cancer cases are reported with more detailed race classifications, aggregation into these broader categories matches the race/ethnic categories for DOF population estimates produced during periods between decennial censuses.

AASR (ages 15 to 19): Age-specific rates were calculated by dividing the number of cases over the six- or twelve-year period in the age group of interest by the sum of the mid-year population estimates over the same time period in the corresponding age group of interest (by sex, race/ethnicity). Age-specific rates are presented per 100,000.[12]

Age-adjusted incidence rate (AAIR) (ages birth to 19): Age-adjusted rates are a weighted average of the age-specific rates, where rates represent the

age distribution of a standard population. All rates in this report are age-adjusted by the direct method to the 2000 U.S. Standard Population and are calculated per 100,000 persons. Age-adjustment allows meaningful comparisons of cancer risk by controlling for differences in the age distribution of two populations under comparison. [12]

EAPC: EAPC determines the degree a rate has increased or decreased over a time period (trend). EAPC was calculated by fitting a linear regression line to the natural logarithm of the rates by calendar year for the 12-year period 1988 to 1999. A trend was determined to be substantial if the slope of the regressed line is statistically different from zero ($p<0.05$).[12]



Major Adolescent Cancers

Leukemia (ICCC I)

Leukemia, or malignancy of the blood-forming hematopoietic system, accounts for the fourth largest number of cancers diagnosed among adolescents, ages 15 to 19, with 746 new cases diagnosed across California between 1988 and 1999. During the most recent six-year period, 1994 to 1999, 388 adolescents were diagnosed with any form of leukemia, making up 14.7 percent of all malignancies diagnosed in this age group.

The ICCC scheme divides leukemia into one of five diagnostic subcategories according to the type of blood cell (or precursor cell) involved: lymphoid leukemia (LL, ICCC Ia), acute non-lymphocytic leukemia (ANLL, ICCC Ib), chronic myeloid leukemia (CML, ICCC Ic), other specified leukemias (ICCC Id), and unspecified leukemias (ICCC Ie). LL is almost entirely composed of acute lymphoblastic leukemia (ALL). As with younger children, ALL is the most frequently occurring adolescent leukemia, accounting for 9.1 percent of all adolescent cancers. ANLL, often referred to as acute myeloid leukemia (AML) (a mix of AML subtypes), accounts for 3.4 percent of total adolescent cases, followed by the incidence of CML, 2.1 percent of total adolescent cases. However, as described previously (see Volume I), the relative frequency of ALL versus AML decreases through childhood. ALL accounted for 81.6 percent of all leukemia cases prior to age ten, but 61.3 percent of leukemia cases diagnosed in adolescents (ages 15 to 19). Additionally, the relative proportion of CML cases increased in adolescence relative to early childhood, 14.2 versus 5.6 percent of all leukemia cases, with adolescent cases appearing more similar to adult type CML versus the juvenile myelomonocytic cases more commonly diagnosed in children under age ten.

Leukemia incidence varies substantially by sex and race/ethnicity (Table 2, Figures 7 and 8). Overall age-specific incidence was highest among males versus females, 3.74 and 2.24 cases per 100,000 adolescents, respectively (all races combined). For this most recent six-year period, 1994 to 1999, Hispanics had the highest overall age-specific rates (4.29 cases per 100,000), followed by rates in Asian/Pacific Islanders (2.63 cases per 100,000) and non-Hispanic whites (2.39 cases per 100,000), with the lowest rates reported among blacks (1.74 cases per 100,000). Race-specific leukemia incidence was particularly high in Hispanics relative to non-Hispanic whites for males, at 5.69 versus 2.63 cases per 100,000, with a less extensive difference in females, 2.82 versus 2.14 cases per 100,000, Hispanic and non-Hispanic females, respectively.

Figure 8 presents the age-specific incidence for all leukemia and major subgroup by race/ethnicity among adolescents. ALL accounted for the majority of leukemia cases diagnosed in this age group, 61.3 percent, but

Table 2

Average Annual Age-Specific and Age-Adjusted Leukemia Incidence (Total and Acute Lymphocytic) in California Children and Adolescents, Ages Birth to 19, by Sex and Race/Ethnicity (1994-1999)

		Leukemia						Acute Lymphocytic					
		15-19 Years			Birth-19 Years			15-19 Years			Birth-19 Years		
		Cases	ASIR	SE	Cases	AAIR	SE	Cases	ASIR	SE	Cases	AAIR	SE
All Races Combined	Male	248	3.74	0.24	1,552	4.84	0.12	159	2.40	0.19	1,198	3.70	0.11
	Female	140	2.24	0.19	1,169	3.80	0.11	79	1.26	0.14	882	2.82	0.10
	Total	388	3.01	0.15	2,721	4.33	0.08	239	1.86	0.12	2,080	3.27	0.07
Non-Hispanic White	Male	79	2.63	0.30	550	4.24	0.18	43	1.43	0.22	411	3.16	0.16
	Female	60	2.14	0.28	442	3.62	0.17	33	1.18	0.20	327	2.66	0.15
	Total	139	2.39	0.20	992	3.94	0.13	77	1.33	0.15	738	2.91	0.11
Black	Male	10	--	--	68	2.84	0.35	7	--	--	43	1.79	0.27
	Female	8	--	--	55	2.39	0.32	5	--	--	32	1.39	0.25
	Total	18	1.74	0.41	123	2.62	0.24	12	--	--	75	1.59	0.18
Hispanic	Male	129	5.69	0.50	769	6.06	0.22	96	4.23	0.43	626	4.87	0.20
	Female	61	2.82	0.36	557	4.49	0.20	37	1.71	0.28	443	3.49	0.17
	Total	190	4.29	0.31	1,326	5.29	0.15	133	3.00	0.26	1,069	4.19	0.13
Asian-Pacific Islander	Male	29	3.72	0.69	150	4.26	0.35	12	--	--	105	2.92	0.29
	Female	11	--	--	102	3.02	0.30	<5	0.54	0.27	70	2.06	0.25
	Total	40	2.63	0.42	252	3.66	0.23	16	1.05	0.26	175	2.50	0.19

Cases=Number of new primary malignant cases initially diagnosed between January 1994 and December 1999, reported to CCR as of August 2001.
Age-specific incidence rate (ASIR)=Average annual age-specific incidence for the six-year period, 1994-1999, reported as cases per 100,000.
Age-adjusted incidence rate (AAIR)=Average annual age-adjusted incidence for the six-year period, 1994-1999, reported as cases per 100,000, adjusted to the 2000 U.S. Standard.
SE=Standard error for the ASIR or AAIR.
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Figure 7

Average Annual Age-Adjusted Leukemia Incidence, All Subtypes, in California Children and Adolescents, Ages 0 to 19, by Sex and Race/Ethnicity (1994-1999)

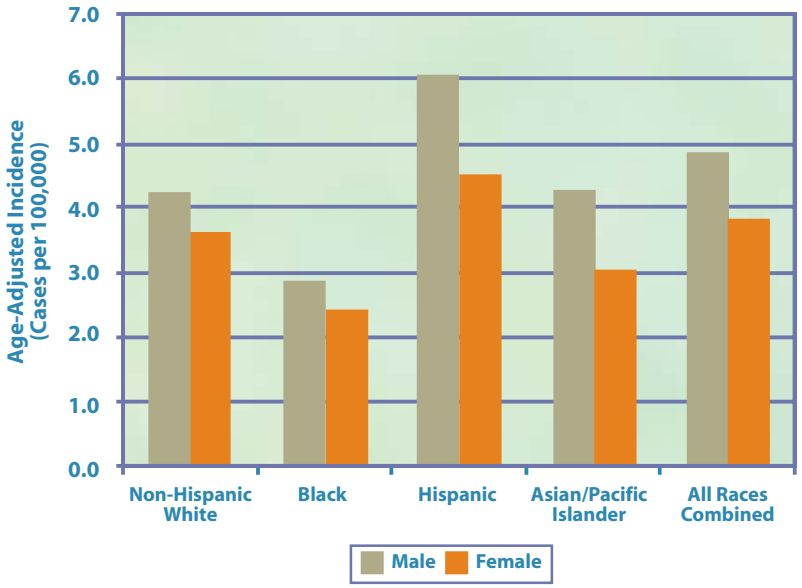

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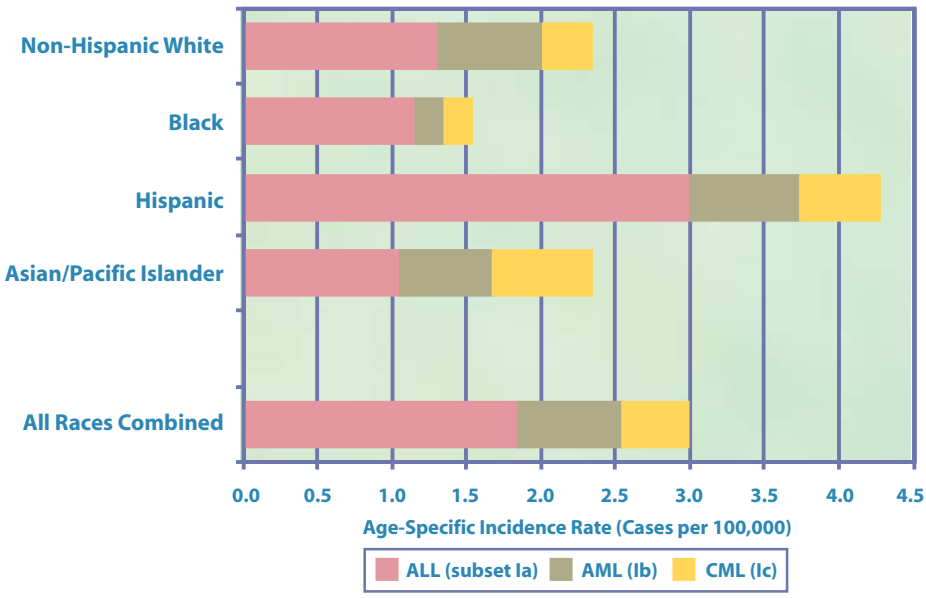
Figure 8
Average Annual Age-Specific Incidence of Leukemia in Adolescents, Ages 15 to 19, by Subtype and Race/ Ethnicity in California (1994-1999)



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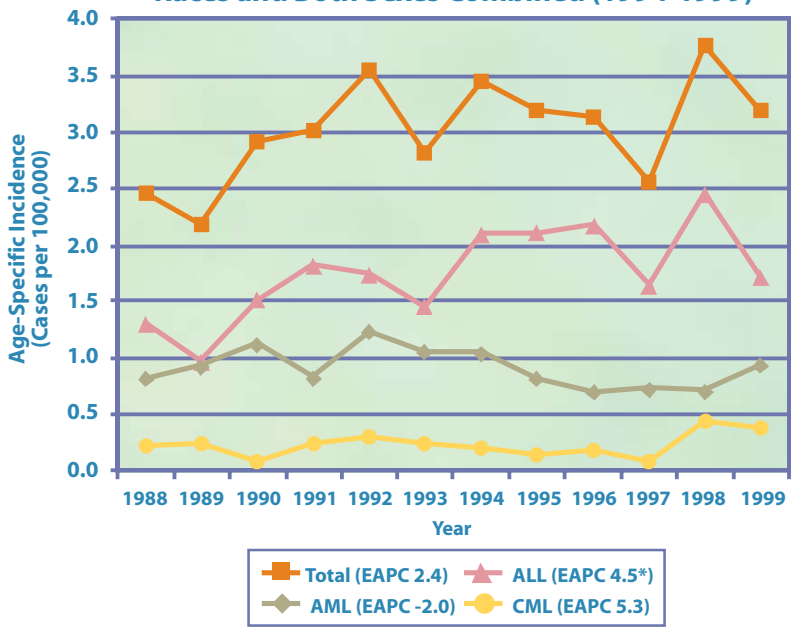
with some variation in the relative proportion between race categories. Age-specific incidence was substantially higher in Hispanics at 3 cases per 100,000, relative to rates among adolescent non-Hispanic whites, blacks, or Asian/Pacific Islanders (Table 2). The higher incidence of ALL in Hispanics (70 percent of all leukemia cases) contributed to the greatest difference in overall age-specific leukemia incidence relative to non-Hispanic whites (55.4 percent of all leukemia cases). The occurrence of the second most common leukemia subtype, AML, appeared relatively similar between non-Hispanic whites, Hispanics, and Asian/Pacific Islanders, at 0.70, 0.74 and 0.63 cases per 100,000, respectively. However, the relative proportion of AML cases was higher in non-Hispanic whites (29.5 percent total leukemia cases) and Asian/Pacific Islanders (35.0 percent total leukemia cases). Age-specific CML incidence was highest in Asian/Pacific Islanders and Hispanics, 0.66 and 0.54 cases per 100,000, and, although based on a smaller number of cases, the relative proportion of CML was highest among Asian/Pacific Islanders (25.0 percent of total leukemia cases) compared to non-Hispanic whites (13.7 percent) and Hispanics (12.6 percent).

In combination with cancer incidence in younger children and teenagers, the total age-adjusted leukemia incidence in Californians under age 20 between 1994 and 1999 was 4.33 cases per 100,000 for both sexes and all races combined, higher in males than females (4.84 versus 3.80 cases per

100,000, respectively) and in Hispanics than non-Hispanic whites (5.29 versus 3.94 cases per 100,000, respectively) (Table 2). Similar relative gender patterns were observed for age-adjusted incidence by major subtype. However, relative race-specific incidence varied by subtype including: ALL incidence highest in Hispanics (4.19 cases per 100,000), particularly in males (4.87 cases per 100,000); AML incidence highest in Asian/Pacific Islanders (0.84 cases per 100,000), in both males and females (0.85 and 0.84 cases per 100,000, respectively); and CML incidence highest in Hispanics and Asian/Pacific Islanders (each at 0.39 cases per 100,000).

The overall incidence of adolescent leukemia in California has increased since the onset of statewide cancer surveillance, with a statistically nonsignificant average annual increase in the age-specific rate since 1988 (EAPC 2.4 p=0.07) (Figure 9). Trends for all races combined varied by specific leukemia subtype, with a statistically significant average annual increase in the age-specific incidence of ALL (EAPC 4.5 p=0.02) and a nonsignificant annual increase for CML (EAPC 5.3 p=0.13). Age-specific incidence of AML declined over the same 12-year period (EAPC -2.0 p=0.23). The largest changes in leukemia incidence occurred among Hispanics, with statistically significant increases in age-specific incidence for all leukemias

Figure 9
Annual Childhood Leukemia Incidence by Subtype Among California Adolescents, Ages 15 to 19, All Races and Both Sexes Combined (1994-1999)



*Statistically significant p<0.05
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combined (EAPC 6.0 p<0.001) and for ALL (EAPC 8.0 p<0.001), in direct contrast to the relatively flat trends or average annual declines observed in non-Hispanic whites (total leukemia: EAPC -0.8 p=0.65; ALL: EAPC 0.8 p=0.74). For all leukemia combined, significant increases in age-specific incidence occurred in both Hispanic males (EAPC 7.7 p=0.001) and females (EAPC 3.7 p=0.04), with ALL incidence increasing significantly in Hispanic males (EAPC 10.4 p=0.002).

In combination with cancer incidence in younger children and teenagers, the total age-adjusted leukemia incidence in Californians under age 20 between 1988 and 1999 followed a relatively flat trend for all races combined (EAPC 0.7 p=0.14), among both males (EAPC 0.9 p=0.12) and females (EAPC 0.4 p=0.53). Hispanic males averaged a statistically significant annual increase (EAPC 2.2 p=0.03), with a positive, but not statistically significant, rise in Hispanic females (EAPC 1.3 p=0.15). However, no other statistically significant average annual trends were observed for overall age-adjusted incidence for any individual race/ethnicity group for either total leukemia or any major subtype, with trends in non-Hispanic whites and Asian/Pacific Islanders slightly negative, and trends in blacks slightly positive.

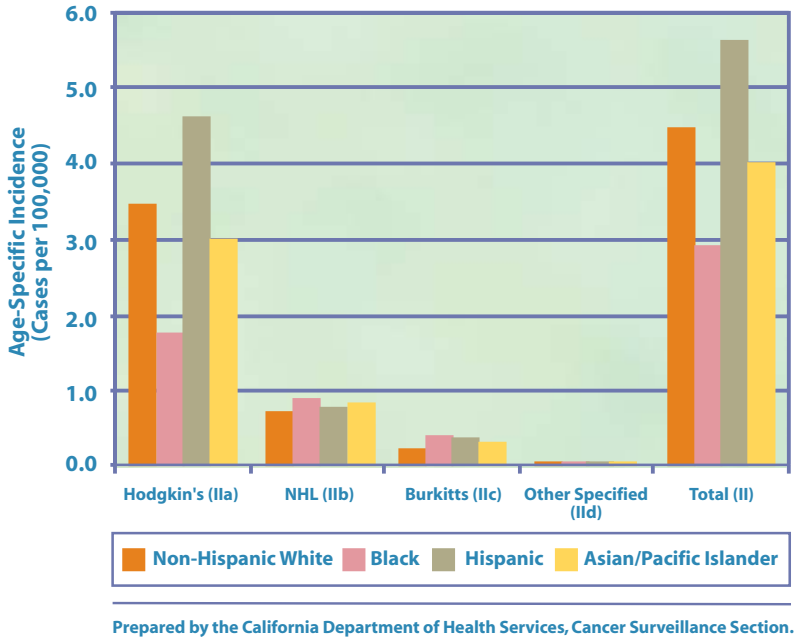
Lymphoma and Other Reticuloendothelial Neoplasms (ICCC II)

Lymphomas, malignancies of the lymphoid cells, constitute the most common malignancy in adolescents, representing 20.2 percent of all malignancies diagnosed in Californians ages 15 to 19, or 1,078 new cases since 1988. Between 1994 and 1999, 533 cases were initially diagnosed among adolescents resulting in an average annual age-specific incidence rate of 4.14 cases per 100,000.

The ICCC scheme classifies lymphomas and related reticuloendothelial neoplasms (ICCC II) into one of five diagnostic subcategories, with the common usage aligning as Hodgkin's disease (subgroup ICCC IIa) and non-Hogkin's lymphoma, or NHL (subgroups IIb, IIc, and IIe) (Figure 10). As described previously (see Volume I), the relative incidence of NHL versus Hodgkin's disease declines throughout childhood (Figure 11). Hodgkin's disease remains rare in children under age ten, with NHL cases responsible for the majority of all lymphoma cases, 71.1 percent. However, by adolescence the pattern has reversed with 65.1 percent of lymphomas diagnosed as Hodgkin's disease, accounting for 13.2 percent of all cancer cases versus 7.0 percent due to NHL.

In contrast to lymphoma incidence in younger children, a more limited sex difference occurs in overall lymphoma incidence among adolescents, with nearly equal age-specific incidence in males and females, 4.33 and 3.93 cases

Figure 10
Histologic Distribution of Lymphoma by Age-Specific Incidence in California Adolescents, Ages 15 to 19, by ICCC Subgroup and Race/Ethnicity, Both Sexes Combined (1994-1999)



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per 100,000, respectively, for all races combined during 1994 through 1999 (Table 3). Age-specific incidence of Hodgkin's disease was higher in females, 2.97 cases per 100,000, than males, 2.43 cases per 100,000 (Figure 12). However, NHL (II b, c, e) remained nearly twice as common in males as females (1.88 versus 0.96 cases per 100,000), during the same six-year period. Age-specific incidence was higher in non-Hispanic whites than Hispanics for all lymphomas combined (4.70 and 4.00 cases per 100,000), for Hodgkin's disease (3.10 and 2.71 cases per 100,000), and for NHL (1.60 and 1.29 cases per 100,000); however, race/ethnicity differences were greater among males than females (Table 3).

The total age-adjusted lymphoma incidence in Californians under age 20 between 1994 and 1999 was 2.05 cases per 100,000 for both sexes and all races combined, higher in males than females (2.40 versus 1.69 cases per 100,000, respectively) and in non-Hispanic whites than Hispanics (2.17 versus 2.04 cases per 100,000, respectively). Similar relative gender patterns were observed in the age-adjusted incidence of NHL but not Hodgkin's disease, where the male to female ratio was nearly equal. Relative race-specific age-adjusted incidence varied slightly, with NHL incidence highest in non-Hispanic whites (1.02 cases per 100,000), particularly in males

Figure 11

Percentage of Childhood and Adolescent Cancers as Lymphoma (Hodgkin's Disease and Non-Hodgkin's) by Age in California, All Races and Both Sexes Combined (1994-1999)

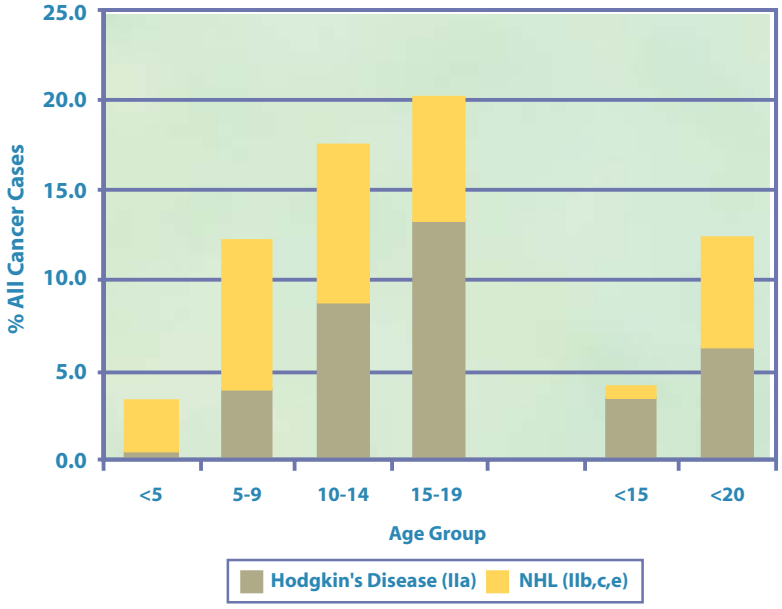

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Table 3

Average Annual Age-Specific and Age-Adjusted Lymphoma Incidence (Hodgkin's Disease and Non-Hodgkin's Lymphomas) in California Children and Adolescents, Ages Birth to 19, by Sex and Race/Ethnicity (1994-1999)

		Hodgkin's Disease (ICCC IIa)						Non-Hodgkin's (ICCC IIb,c,e)					
		15-19 Years			Birth-19 Years			15-19 Years			Birth-19 Years		
		Cases	ASIR	SE	Cases	AAIR	SE	Cases	ASIR	SE	Cases	AAIR	SE
All Races Combined	Male	161	2.43	0.19	300	1.07	0.06	125	1.88	0.17	388	1.31	0.07
	Female	186	2.97	0.22	273	1.06	0.06	60	0.96	0.12	174	0.62	0.05
	Total	347	2.69	0.14	573	1.06	0.04	185	1.44	0.11	562	0.97	0.04
Non-Hispanic White	Male	85	2.83	0.31	135	1.10	0.09	69	2.29	0.28	179	1.42	0.11
	Female	95	3.39	0.35	136	1.19	0.10	24	0.86	0.17	71	0.59	0.07
	Total	180	3.10	0.23	271	1.14	0.07	93	1.60	0.17	250	1.02	0.06
Black	Male	12	--	--	18	0.84	0.20	9	--	--	31	1.33	0.24
	Female	10	--	--	19	0.92	0.21	<5	--	--	14	--	--
	Total	22	2.13	0.45	37	0.88	0.14	12	--	--	45	0.99	0.15
Hispanic	Male	53	2.34	0.32	125	1.20	0.11	38	1.68	0.27	133	1.18	0.10
	Female	67	3.10	0.38	100	1.09	0.11	19	0.88	0.20	60	0.57	0.07
	Total	120	2.71	0.25	225	1.15	0.08	57	1.29	0.17	193	0.88	0.06
Asian-Pacific Islander	Male	9	--	--	17	0.53	0.13	8	--	--	35	1.04	0.18
	Female	9	--	--	10	--	--	13	--	--	27	0.86	0.17
	Total	18	1.18	0.28	27	0.43	0.08	21	1.38	0.30	62	0.96	0.12

Cases=Number of new primary malignant cases initially diagnosed between January 1, 1994, and December 31, 1999, reported to CCR as of August 2001.
Age-specific incidence rate (ASIR)=Average annual age-specific incidence for the six-year period, 1994-1999, reported as cases per 100,000.
Age-adjusted incidence rate (AAIR)=Average annual age-adjusted incidence for the six-year period, 1994-1999, reported as cases per 100,000, adjusted to the 2000 U.S. Standard.
SE=Standard error for the AAIR.
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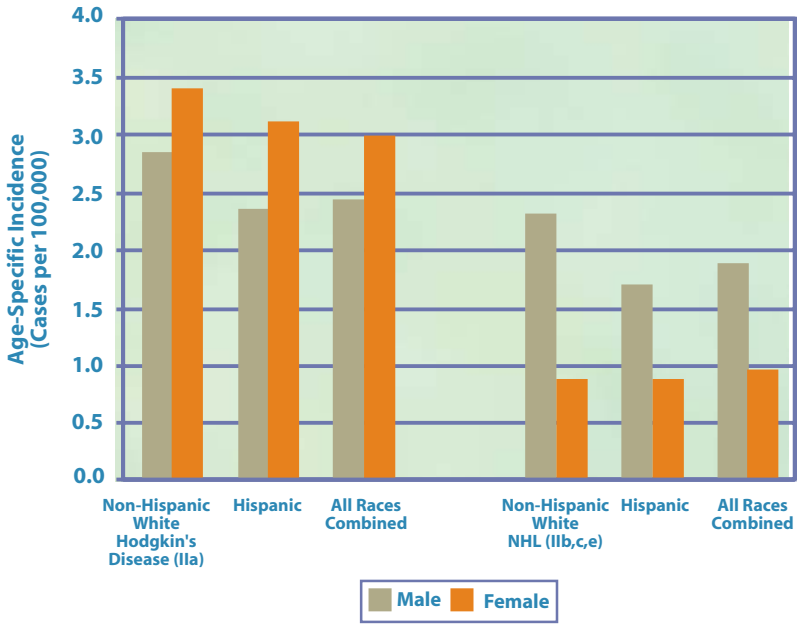
Figure 12

Average Annual Age-Specific Lymphoma (Hodgkin's and Non-Hodgkin's) Incidence in California Adolescents, Ages 15 to 19, by Sex and Race/Ethnicity (1994-1999)



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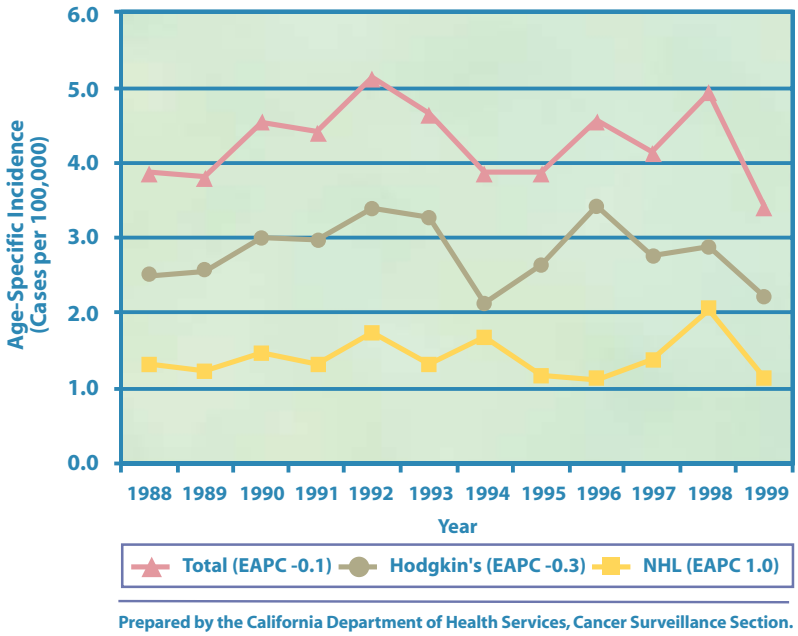
(1.42 cases per 100,000). The incidence of Hodgkin's disease is highest in Hispanics (1.15 cases per 100,000), specifically in males (1.20 cases per 100,000), and non-Hispanic whites (1.14 cases per 100,000), particularly females (1.19 cases per 100,000).

In adolescents, ages 15 to 19, the ASIR for all lymphomas remained relatively flat, with no statistically significant trend since 1988 (EAPC -0.1 p=0.95) (Figure 13). Similar trends were observed for Hodgkin's disease (EAPC -0.3 p=0.81) and NHL (EAPC 1.0 p=0.57) for both sexes combined. Sex-specific trends for all lymphomas and all races combined, although not statistically significant, were positive for both adolescent males (EAPC 2.6 p= 0.17) and females (EAPC 2.3 p=0.07). Age-specific incidence trends were significantly positive for NHL in non-Hispanic white males (EAPC 6.4 $p<0.05$), but not females (EAPC -6.3 p=0.10), and for Hodgkin's disease in Hispanics, both sexes combined (EAPC 4.6 p=0.04).

In combination with lymphoma incidence in younger children and teenagers, the total age-adjusted lymphoma incidence in Californians under age 20 between 1988 and 1999 followed a relatively flat, slightly downward average

annual trend for all races combined (EAPC -0.9 p=0.22), among both males (EAPC -0.8 p=0.36) and females (EAPC -0.9 p=0.41). No statistically significant trends were observed for overall age-adjusted incidence for any individual race/ethnicity group for either total lymphoma, Hodgkin's disease, or NHL.

Figure 13
Annual Lymphoma Incidence, Hodgkin's Disease (IIa) and Non-Hodgkin's (IIb,c,e) in California Adolescents, Ages 15 to 19, All Races and Both Sexes Combined (1988-1999)



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Central Nervous System and Miscellaneous Intracranial and Intraspinal Neoplasms (ICCC III)

CNS tumors are the fifth most common malignancy in adolescents ages 15 to 19, accounting for almost ten percent of all diagnoses. Although the pathological difference between malignant and non-malignant brain tumors (included in ICCC scheme) often does not correspond with clinical ramifications, CCR surveillance was legally restricted to malignant tumors up until cases initially diagnosed through December 31, 2000. Therefore, the description of all current California data includes only malignant CNS tumors.

For the 12-year period, 1988 through 1999, 486 cases of primary malignant tumors of CNS were diagnosed in adolescents across California. Between 1994 and 1999, the overall average annual age-specific incidence was 2.02 cases per 100,000 adolescents, with rates 36 percent higher among males than females (2.32 and 1.70 cases per 100,000 males and females, respectively) (Figure 14). The most common glioma, astrocytomas, account for 53.1 percent of all CNS tumors (ICCC IIIX), followed by primitive neuroectodermal tumors (PNET) 18.5 percent (PNET, ICCC IIIX), other gliomas 10.0 percent (ICCC IIIX), and ependymomas 8.5 percent (ICCC IIIX). In comparison with younger children, age-specific adolescent incidence declined the greatest for PNET, with a greater proportion of malignant CNS tumors diagnosed as astrocytomas and

Figure 14
Average Annual Age-Specific Incidence of Malignant CNS Tumors in California Adolescents, Ages 15 to 19, by Sex and Race/Ethnicity (1994-1999)

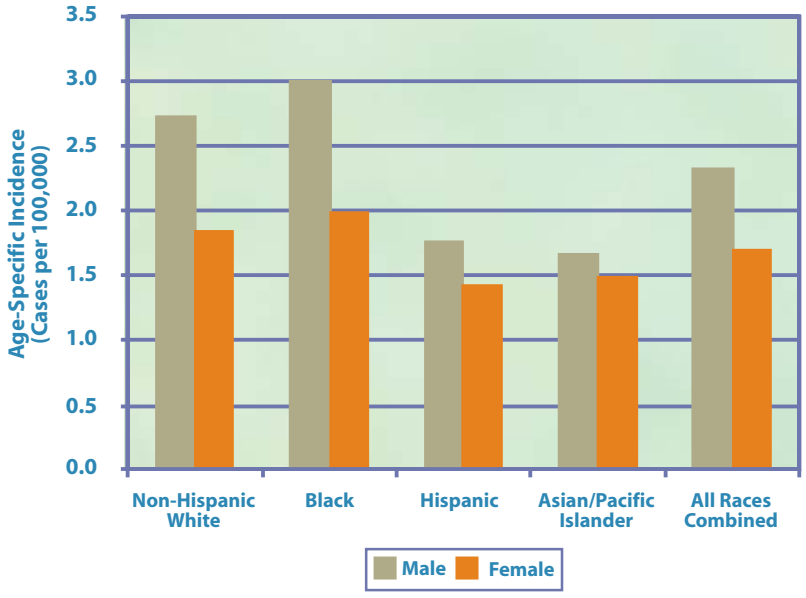

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Figure 15

Relative Age-Specific Incidence of CNS Tumors by Age and ICCC Category in California, Both Sexes and All Races Combined (1994-1999)

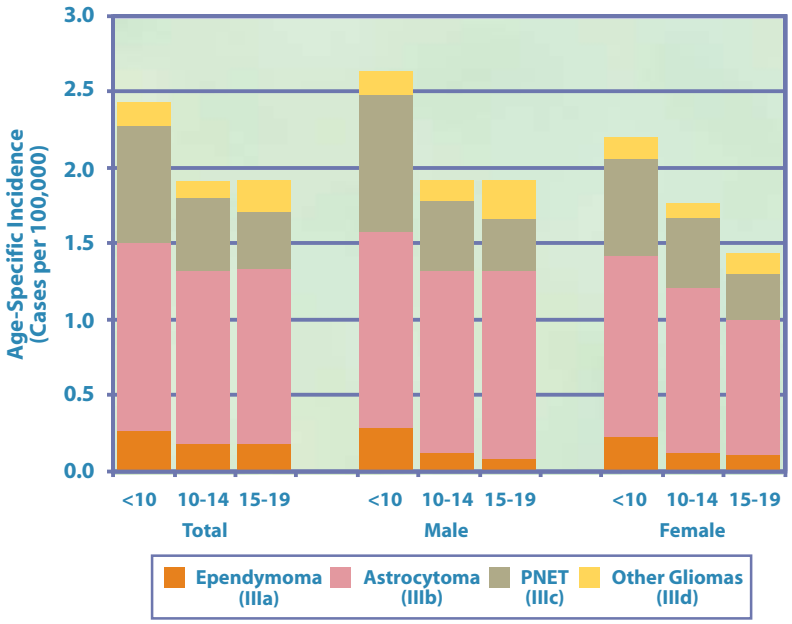

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Figure 16

Annual Age-Specific Incidence of Malignant CNS Tumors in California Adolescents, Ages 15 to 19, All Races Combined (1988-1999)

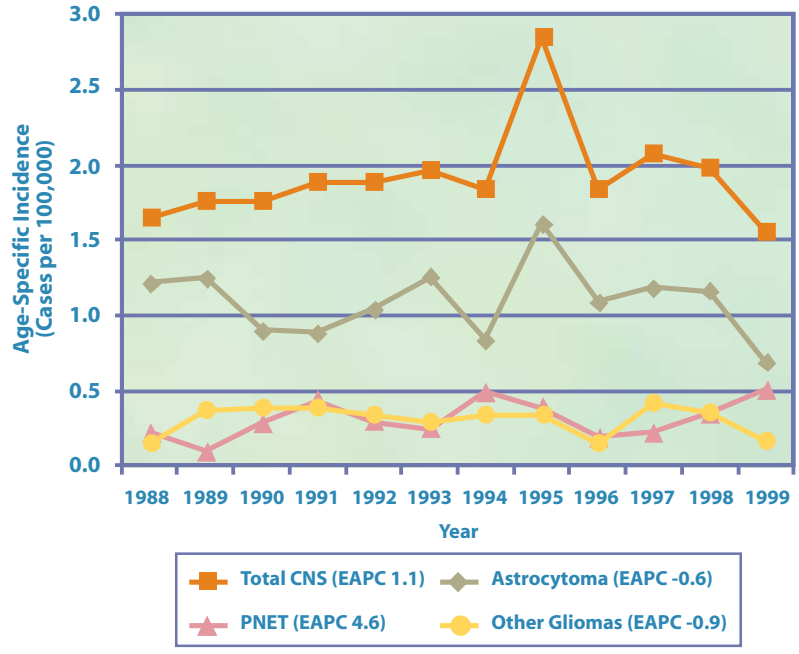

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Table 4
Average Annual Age-Adjusted Incidence of Malignant CNS Tumors in California Children, Ages Birth to 19, by ICCC Category, Sex and Race/Ethnicity (1994-1999)

		Ependymoma (IIIa) Birth-19 Years			Astrocytoma (IIIb) Birth-19 Years			PNET (IIIc) Birth-19 Years			Other Glioma (IIId) Birth-19 Years		
		Cases	AAIR	SE	Cases	AAIR	SE	Cases	AAIR	SE	Cases	AAIR	SE
All Races Combined	Male	70	0.22	0.03	389	1.26	0.06	218	0.68	0.05	53	0.18	0.02
	Female	62	0.21	0.03	323	1.09	0.06	154	0.51	0.04	38	0.13	0.02
	Total	132	0.21	0.02	712	1.18	0.04	372	0.60	0.03	91	0.15	0.02
Non-Hispanic White	Male	37	0.29	0.05	219	1.71	0.12	106	0.81	0.08	31	0.24	0.04
	Female	34	0.28	0.05	174	1.43	0.11	64	0.52	0.07	15	0.13	0.03
	Total	71	0.28	0.03	393	1.57	0.08	170	0.67	0.05	46	0.19	0.03
Black	Male	5	--	--	29	1.25	0.23	13	--	--	7	--	--
	Female	5	--	--	19	0.84	0.19	12	--	--	6	--	--
	Total	10	--	--	48	1.05	0.15	25	0.53	0.11	13	0.28	0.08
Hispanic	Male	20	0.15	0.04	113	0.92	0.09	79	0.63	0.07	11	--	--
	Female	12	--	--	108	0.91	0.09	66	0.52	0.07	14	--	--
	Total	32	0.12	0.02	221	0.92	0.06	145	0.57	0.05	25	0.10	0.02
Asian-Pacific Islander	Male	7	--	--	18	0.54	0.13	18	0.53	0.13	<5	--	--
	Female	9	--	--	18	0.56	0.13	10	--	--	<5	--	--
	Total	16	0.24	0.06	36	0.55	0.09	28	0.43	0.08	5	--	--

Cases=Number of new primary malignant cases initially diagnosed between January 1, 1994, and December 31, 1999, reported to CCR as of August 2001.
Age-adjusted incidence rate (AAIR)=Average annual age-adjusted incidence for the six-year period, 1994-1999, reported as cases per 100,000, adjusted to the 2000 U.S. Standard.
SE=Standard error for the AAIR.
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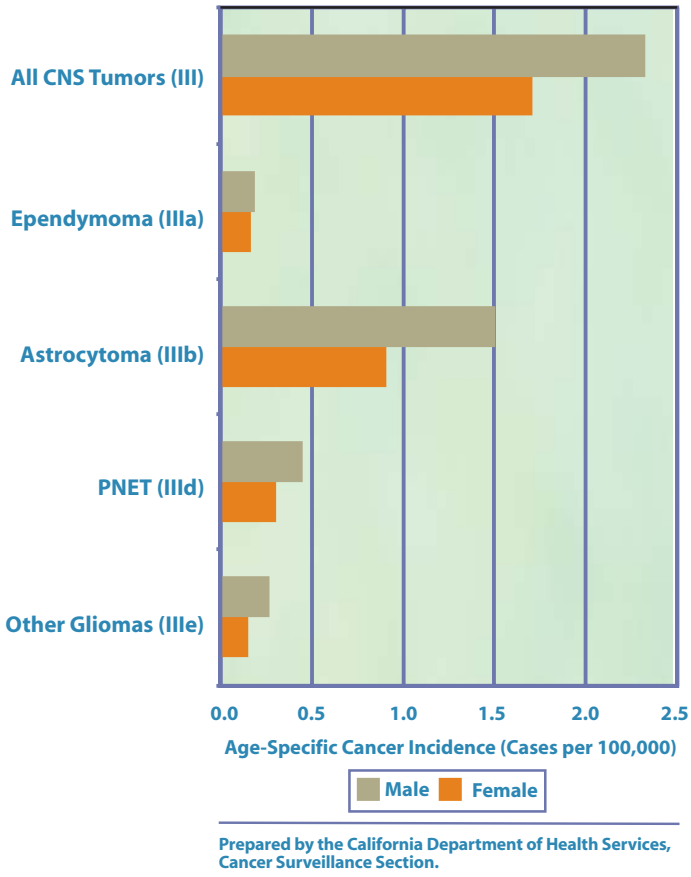
other gliomas (Figure 15). Figure 16 illustrates the sex and age-specific incidence rates by ICCC histologic group for adolescents ages 15 to 19, with male predominance particularly apparent for astrocytomas and other gliomas.

In adolescents, as with younger children, the age-specific incidence of malignant CNS tumors varies by race/ethnicity with higher incidence in blacks and non-Hispanic whites (Figure 14); however, rates among blacks were based on a limited number of cases, 26 total cases diagnosed between 1994 and 1999.

Age-adjusted incidence rates for all CNS tumors combined among children and adolescents under age 20 were highest among non-Hispanic whites and blacks (2.99 and 2.60 cases per 100,000, respectively), and lower among Hispanics (2.05 cases per 100,000) and Asian/Pacific Islanders (1.61 cases per 100,000). Race-specific incidence varied by subtype with rates for gliomas, both astrocytomas and other gliomas, highest in non-Hispanic whites; for PNET in non-Hispanic whites and Hispanics; and, for ependymoma in non-Hispanic whites and Asian/Pacific Islanders (Table 4).

The age-specific incidence rate for CNS tumors in adolescents, ages 15 to 19, demonstrated a positive, yet statistically nonsignificant increase since 1988 (EAPC 1.1 p=0.45) for all races and both sexes combined (Figure 17). A positive, but again statistically nonsignificant average annual increase also occurred for PNET (EAPC 4.6 p=0.19), but with slightly negative trends for astrocytomas (EAPC -0.6 p=0.76) and other gliomas (EAPC -0.9 p=0.76).

Figure 17
Histologic Distribution of Malignant CNS Tumors by Incidence in California Adolescents, Ages 15 to 19, by ICCC Subgroup and Sex, All Races Combined (1994-1999)



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Sex-specific trends for all CNS tumors and all races combined, although not statistically significant, were positive for adolescent males (EAPC 2.6 p= 0.21), but not females (EAPC -0.39 p=0.86), with similar patterns observed for astrocyotma and other gliomas.

In children and adolescents under age 20, the age-adjusted incidence rate for all CNS tumors decreased slightly since 1988 (EAPC -0.9 p=0.13). Similar declines were seen by sex, with the average annual decline significant in females (EAPC -1.6 p=0.02) but not males (EAPC -0.3 p=0.76). Significant negative trends, or average annual declines, occurred for astrocytomas for both sexes combined (EAPC -1.9 p=0.04), and particularly among females (EAPC -3.3 p= 0.01). No other CNS ICCC diagnostic subgroup demonstrated statistically significant trends in age-adjusted incidence since 1988.

Malignant Bone Tumors (ICCC VIII)

Malignant bone tumors consist of a variety of sarcomas of the bone and cartilage that rarely occur either in adults or children under age five. However, malignant bone tumors account for 7.6 percent of all reported malignancies in adolescents ages 15 to 19. Additionally, nonmalignant or benign bone tumors also occur, but are not reportable to the CCR. Osteosarcoma (ICCC VIIIa) and Ewing's sarcoma (ICCC VIIIc) are the major types of adolescent bone malignancies, 62.0 and 25.0 percent of all cases reported to CCR. Although any bone may be affected, the majority of Ewing's and osteosarcoma cases involve bones of the lower extremities or pelvic girdle.

In California since 1988, 406 adolescents were diagnosed with a malignant bone tumor. In the most recent six-year period, 1994 to 1999, an average of 33 new cases occurred annually, representing an age-specific incidence of 1.55 cases per 100,000, considerably higher than incidence in children under ten (Figure 18). Males had over twice the age-specific incidence relative to females (2.07 and 1.01 cases per 100,000) (Figure 19). As with younger children, bone cancer incidence was highest in non-Hispanic whites and blacks (Figure 20); however, few cases were reported among blacks (21 cases) and Asian/Pacific Islanders (16 cases).

Figure 18
Age-Specific and Age-Adjusted Cancer Incidence of Malignant Bone Tumors Among Children and Adolescents in California, by ICCC and Age Group, Both Sexes and All Races Combined (1994-1999)

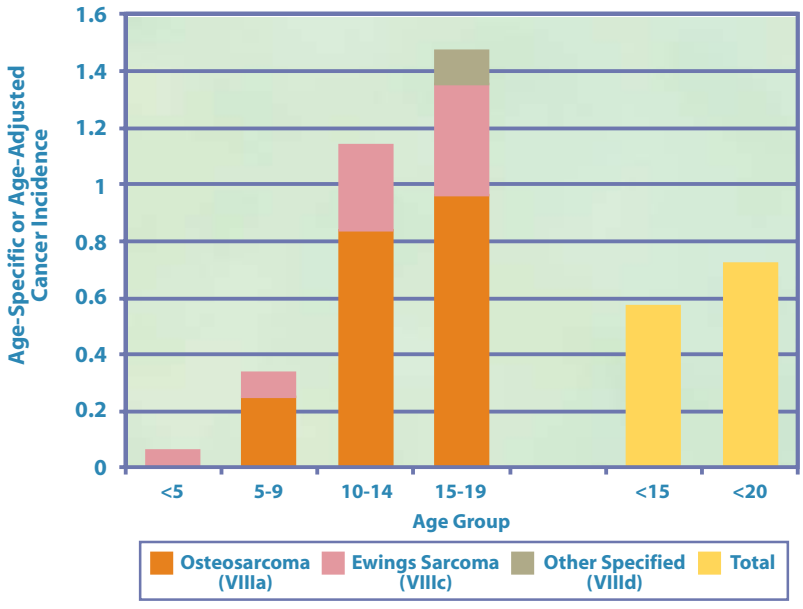

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Figure 19

Average Annual Age-Specific Incidence of Malignant Bone Tumors in California Adolescents, Ages 15 to 19, by ICCC Category and Sex, All Races Combined (1994-1999)

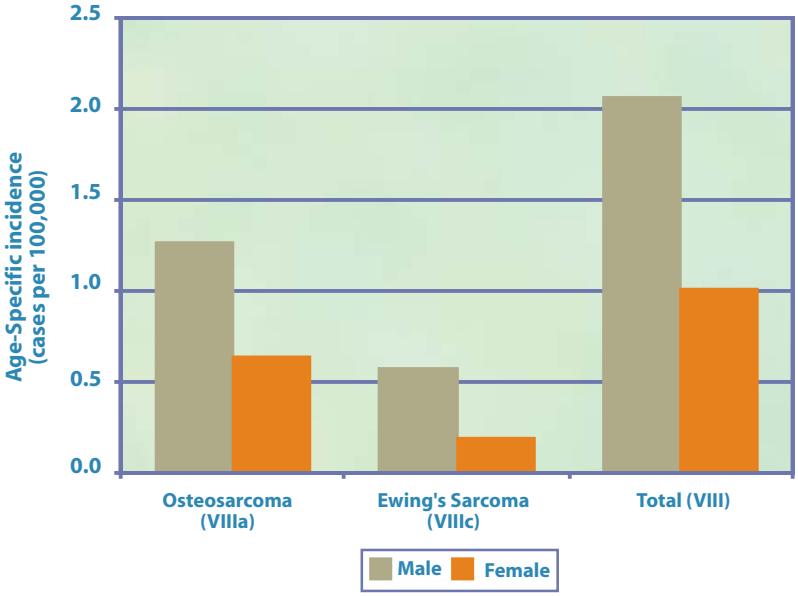

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Figure 20

Average Annual Age-Specific Incidence of Malignant Bone Tumors in California Adolescents, Ages 15 to 19, by Race/Ethnicity, Both Sexes Combined (1994-1999)

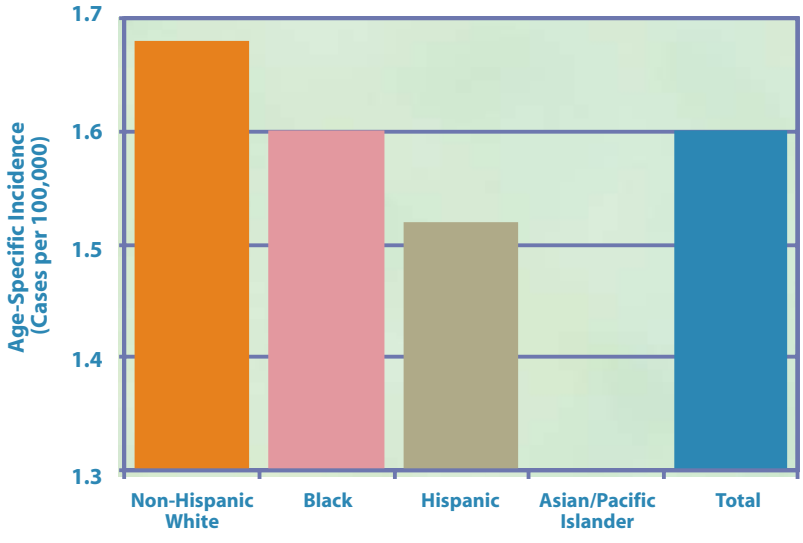

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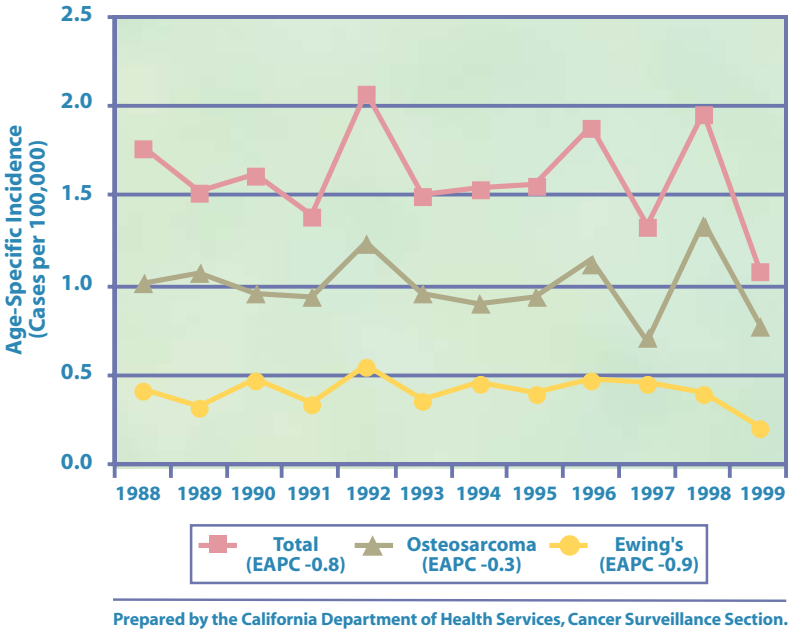
Figure 21
Annual Age-Specific Incidence of Malignant Bone Tumors Among Adolescents, Ages 15 to 19, in California, Both Sexes and All Races Combined (1988-1999)



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Age-adjusted incidence rates among children and adolescents under age 20 were highest among non-Hispanic whites and Hispanics (0.89 and 0.78 cases per 100,000 respectively), closely followed by rates in blacks and Asian/ Pacific Islanders (0.71 and 0.67 cases per 100,000, respectively). For both osteosarcoma and Ewing's sarcoma, age-adjusted incidence was higher among non-Hispanic whites relative to Hispanics.

In the 12-year period 1988 to 1999, the ASIR for malignant bone tumors declined among adolescents, ages 15 to 19 (EAPC 0.8 p=0.62); with slight average annual declines in the age-specific incidence of both osteosarcoma (EAPC -0.3 p=0.87) and Ewing's sarcoma (EAPC -0.9 p=0.66) (Figure 21).

Soft Tissue Sarcomas (ICCC IX)

Adolescent soft tissue sarcomas may initiate in many types of tissue, including in smooth (leiomyosarcomas) and striated muscle (rhabdomyosarcomas), fat (liposarcomas), fibrous tissues (fibrosarcomas), or cartilage (chondrosarcomas). Among children and adolescents, soft tissue sarcomas are often categorized as rhabdomyosarcomas (ICCC IXa), or non-rhabdomyosarcomas (non-RMS, ICCC IXb-e). In California, these soft tissue tumors accounted for 7.6 percent of all adolescent cancers (ages 15 to 19), with the non-RMS tumors accounting for the majority of cases, 75.8 percent, in contrast to younger children in which rhabdomyosarcoma (RMS) is the most common soft tissue sarcoma. Additionally, among RMS cases, alveolar rhabdomyosarcoma predominates in this age group, unlike the embryonal rhabdomyosarcomas occurring in younger children (Figure 22).

In California between 1994 and 1999, the overall age-specific incidence for all soft tissue sarcomas was 1.54 cases per 100,000 adolescents, higher in males than females (1.82 and 1.25 cases per 100,000) (Figure 23). This gender difference was greatest for RMS cases, nearly twice as high in males as in females, but substantially less so for non-RMS cases, which were 34.7 percent higher in males. Age-specific incidence rates were highest in blacks and Asian/ Pacific Islanders (2.44 and 2.18 cases per 100,000, respectively), followed by

Figure 22
Age-Specific and Age-Adjusted Incidence of Childhood and Adolescent Soft Tissue Sarcomas (Rhabdomyosarcoma and non-RMS) in California, All Races and Both Sexes Combined (1994-1999)

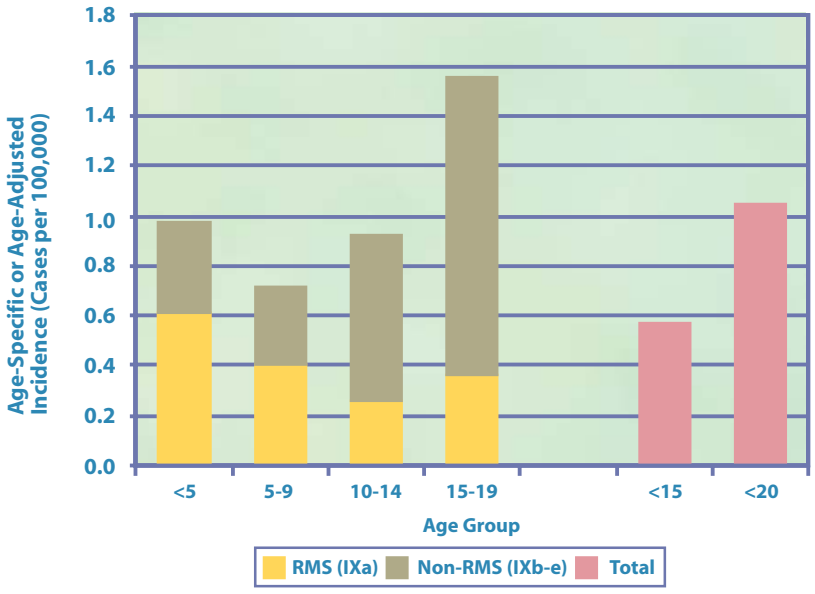

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FIgure 23

Average Annual Age-Specific Incidence of Soft Tissue Sarcomas (Rhabdomyosarcoma and non-RMS) in California Adolescents, Ages 15 to 19, by Sex, All Races Combined (1994-1999)

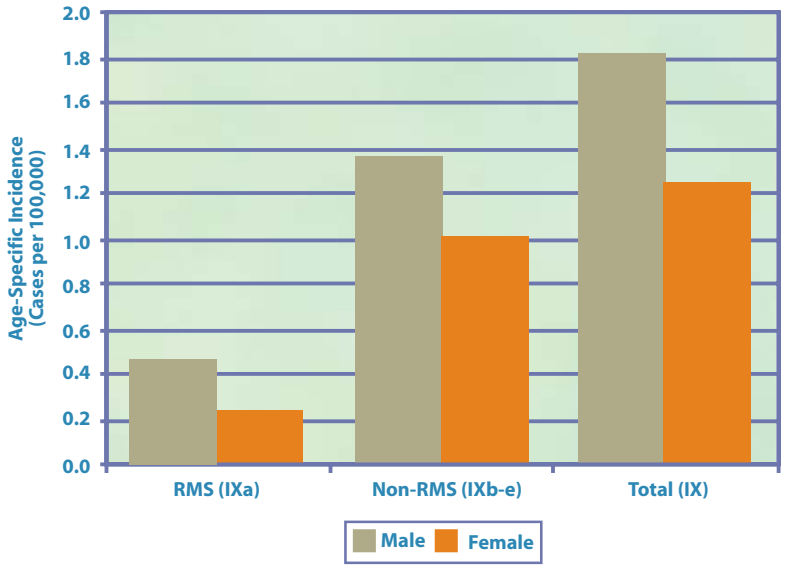

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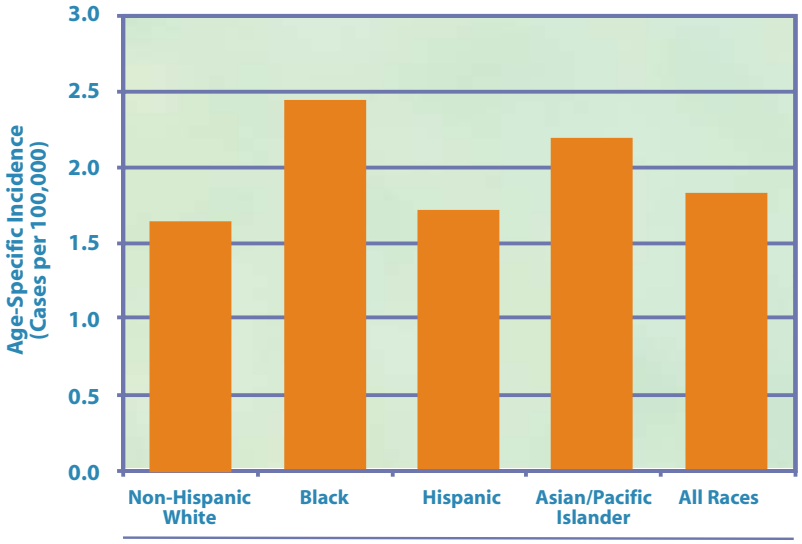
Figure 24

Average Annual Age-Specific Incidence of Soft Tissue Sarcomas in California Adolescents, Ages 15 to 19, by Race/Ethnicity, Both Sexes Combined (1994-1999)



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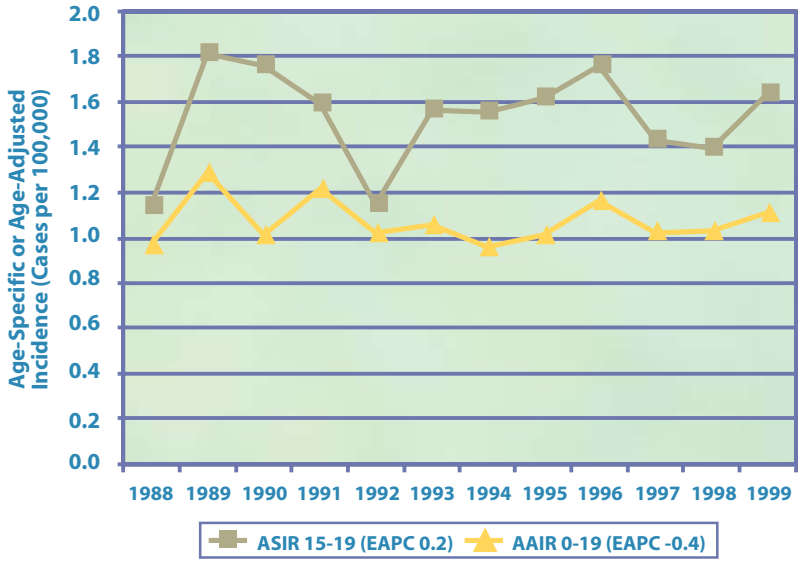
rates for Hispanic and non-Hispanic whites (1.72 and 1.63 cases per 100,000, respectively) (Figure 24).

In the combined incidence of soft tissue sarcomas in younger children and teenagers, the age-adjusted rate was 1.04 cases per 100,000 residents under age 20, with a smaller male predominance of overall cases, 1.14 versus 0.93 cases per 100,000 males and females, respectively. The age-adjusted incidence of soft tissue sarcomas was highest in blacks at 1.30 cases per 100,000, followed by rates in non-Hispanic whites, Hispanics, and Asian/Pacific Islanders. Additional variation by race/ethnicity occurred in the relative incidence of RMS to non-RMS, with blacks and Hispanics having a substantially higher age-adjusted incidence of non-RMS (over 62 percent of all soft tissue sarcomas) than non-Hispanic whites (55 percent of all cases). In contrast, the relative occurrence of RMS and non-RMS cases was nearly equal among Asian/Pacific Islanders (54.5 and 45.5 percent of cases).

The age-specific incidence of soft tissue sarcomas in California has remained relatively flat in adolescents ages 15 to 19, with no statistically significant overall trend since 1988 (EAPC 0.2 p=0.90) (Figure 25). However, an increasing, but nonsignificant average annual increase was observed among adolescent males (EAPC 1.9 p= 0.17), but not females (EAPC -2.3 p=0.39), for all races combined. A similar trend was observed for the annual age-adjusted incidence of soft tissue sarcomas in children and adolescents under age 20 (EAPC -0.4 p=0.67).

Figure 25
Annual Age-Specific (Ages 15-19) and Age-Adjusted (0-19) Incidence of Soft Tissue Sarcomas in California Children and Adolescents, Both Sexes and All Races Combined (1988-1999)



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Germ Cell, Trophoblastic, and Other Gonadal Neoplasms (ICCC X)

Germ cell, trophoblastic, and other gonadal neoplasms (GCTOG) consist of a heterogeneous group of tumors accounting for 17.0 percent of all malignant cancers diagnosed in adolescents ages 15 to 19. But only four percent among children under age 15 in California (benign or *in situ* GCTOG tumors) also occur. The ICCC classification scheme categorizes these germ cell and related tumors based on the type of originating cells, usually germ or trophoblastic cells, and location, either in the gonads (testicles or ovaries), CNS, mediastinum or pelvic region. In older adolescents, the majority (83.9 percent) of these tumors arise in the gonads (testicles or ovaries), with the remainder, or non-gonadal tumors, initiating in embryonic-related cells of the CNS, retroperitoneum, or other soft tissues (Figure 26).

Since 1988, 807 cases of malignant germ cell and related neoplasms have been diagnosed in adolescents across California. In the most recent six-year period, 1994 to 1999, the overall ASIR for GCTOG was 3.47 cases per 100,000 adolescents (ages 15 to 19), with rates higher among males than females, 4.43 versus 2.45 cases per 100,000, respectively. Age-specific incidence of all GCTOG tumors was highest in Hispanics and non-Hispanic whites (4.40 and 3.03 cases per 100,000, respectively) with slightly lower

Figure 26
Average Annual Age-Specific Incidence of Germ-Cell, Trophoblastic and Other Gonadal Neoplasms in California Adolescents, Ages 15 to 19, by Sex, All Races Combined (1994-1999)

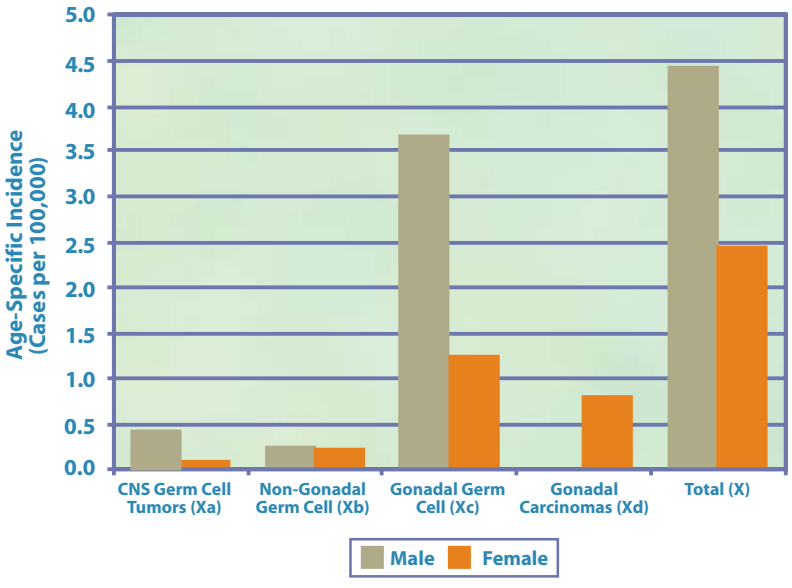

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Table 5
Average Annual Age-Specific Incidence of Malignant Germ Cell, Trophoblastic, and Related Neoplasms in California Adolescents, Ages 15 to 19, by Select ICCC Category, Sex and Race/Ethnicity (1994-1999)

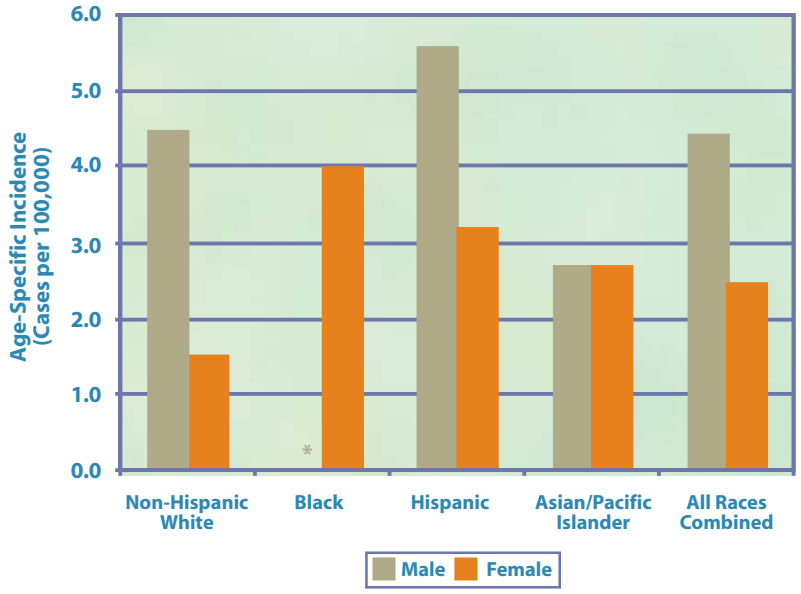
		Total (ICCC X)			Gonadal Germ Cell (Xc)			Gonadal Carcinomas (Xd)		
		15-19 Years			15-19 Years			15-19 Years		
		Cases	ASIR	SE	Cases	ASIR	SE	Cases	ASIR	SE
All Races Combined	Male	294	4.43	0.26	244	3.68	0.24	<5	--	--
	Female	153	2.45	0.20	78	1.25	0.14	50	0.80	0.11
	Total	447	3.47	0.16	322	2.50	0.14	53	0.41	0.06
Non-Hispanic White	Male	134	4.46	0.38	122	4.06	0.37	<5	--	--
	Female	42	1.50	0.23	16	0.57	0.14	18	0.64	0.15
	Total	176	3.03	0.23	138	2.37	0.20	20	0.34	0.08
Black	Male	7	--	--	<5	--	--	<5	--	--
	Female	20	3.98	0.89	12	--	--	<5	--	--
	Total	27	2.61	0.50	16	1.55	0.39	<5	--	--
Hispanic	Male	126	5.56	0.49	105	4.63	0.45	<5	--	--
	Female	69	3.19	0.38	37	1.71	0.28	22	1.02	0.22
	Total	195	4.40	0.32	142	3.21	0.27	23	0.52	0.11
Asian-Pacific Islander	Male	21	2.69	0.59	7	--	--	<5	--	--
	Female	20	2.69	0.60	13	--	--	<5	--	--
	Total	41	2.69	0.42	20	1.31	0.29	<5	--	--

Cases=Number of new primary malignant cases initially diagnosed between January 1, 1994, and December 31, 1999, reported to CCR as of August 2001.
Age-specific incidence rate (ASIR)=Average annual age-specific incidence for the six-year period, 1994-1999, reported as cases per 100,000.
SE=Standard error for the ASIR.
Prepared by the California Department of Health Services, Cancer Surveillance Section.

rates for Asian/Pacific Islanders and blacks (2.69 and 2.61 cases per 100,000, respectively) (Table 5).

Overall age-specific incidence among Hispanic male adolescents, at 5.56 cases per 100,000, was substantially higher than comparable rates in non-Hispanic whites (4.46 cases per 100,000) or Asian/Pacific Islanders (2.69 cases per 100,000) (Figure 27), due to a higher incidence of testicular germ cell (within ICCC Xc) tumors (4.63 cases per 100,000). In adolescent females, the age-specific incidence was highest among blacks (3.98 cases per 100,000), followed by Hispanics (3.19 cases per 100,000), Asian/Pacific Islanders (2.69 cases per 100,000) and non-Hispanic whites (1.50 cases per 100,000), again mirroring the relative order of age-specific incidence for ovarian germ cell malignancies (within ICCC Xc), highest among black females at 2.39 cases per 100,000 and lowest among non-Hispanic whites at 0.57 cases per 100,000. Over 90 percent of all gonadal carcinomas were diagnosed in young women (ICCC Xd); these ovarian malignancies were uncommon among black and Asian/Pacific Islander adolescents (fewer than two new cases per year), with Hispanic age-specific incidence 59.4 percent higher than comparable non-Hispanic white rates (1.02 versus 0.64 cases per 100,000).

Figure 27
Average Annual Age-Specific Incidence of Germ Cell, Trophoblastic, and Other Gonadal Neoplasms in California Adolescents, Ages 15 to 19, by Sex and Race/Ethnicity (1994-1999)



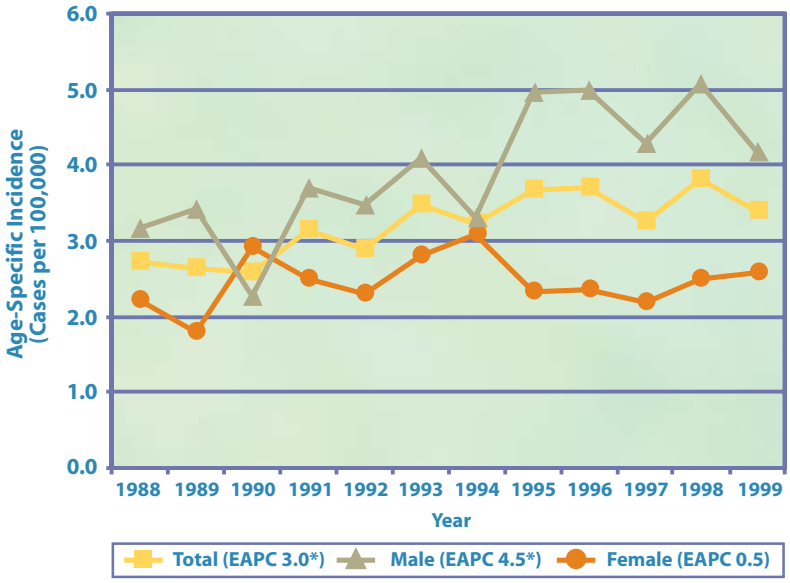
* < 10 cases
Prepared by the California Department of Health Services, Cancer Surveillance Section.

In California, the average annual age-adjusted incidence for all GCTOG malignancies in residents under age 20 was 1.31 cases per 100,000 during 1994 to 1999. Overall age-adjusted incidence was higher in males (1.49 cases per 100,000) than females (1.11 cases per 100,000); however, rates varied substantially by diagnostic subgroup. Hispanics and Asian/Pacific Islanders had the highest overall age-adjusted incidence of germ cell and related malignancies (1.63 and 1.49 cases per 100,0000, respectively), followed by rates in non-Hispanic whites and blacks (1.08 and 0.90 cases per 100,000). Sex-specific, age-adjusted rates were highest among Hispanic males (1.87 cases per 100,000) and Asian/Pacific Islander females (1.80 cases per 100,000) under age 20.

The overall ASIR of GCTOG tumors increased significantly in males (EAPC 4.5 $p<0.01$), but not females (EAPC 0.5 $p=0.69$), from 1988 to 1999, leading to a total 34.1 percent increase among California adolescents ages 15 to 19 (Figure 28). Increases in gonadal germ cell tumors (ICCC Xc), specifically

Figure 28

Annual Age-Specific Incidence of Germ Cell, Trophoblastic, and Other Gonadal Neoplasms in California Adolescents, Ages 15 to 19, by Sex, All Races Combined (1988-1999)



* p<0.05

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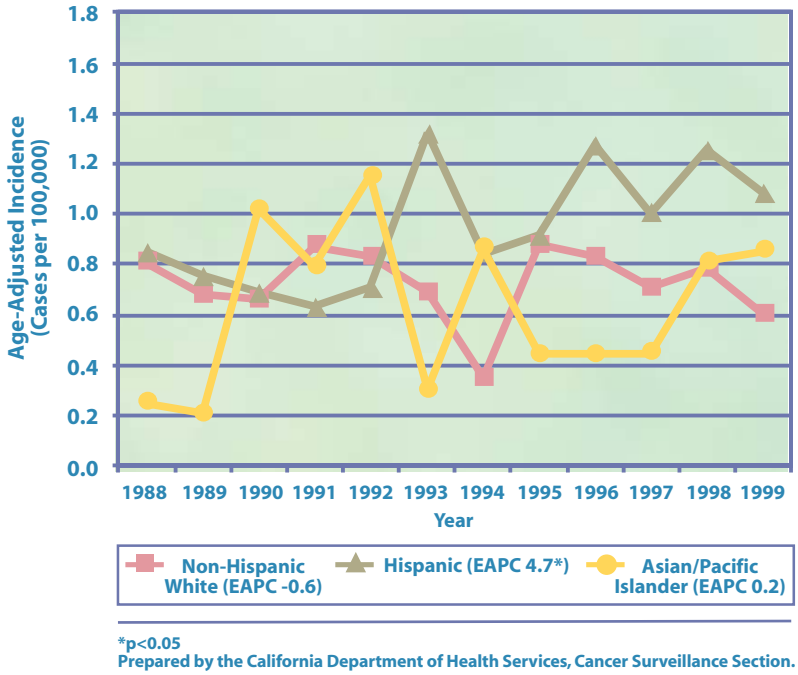
testicular tumors in males (EAPC 5.5 p=0.01), particularly among Hispanic males in which rates doubled since 1988 (EAPC 10.3 p=0.01), contributed substantially to this increase. However, the incidence of ovarian germ cell tumors in Hispanic females increased nearly 1.5 times between 1988 and 1999, approaching statistical significance (EAPC 5.0 p=0.06).

Since 1988, the age-adjusted incidence of GCTOG in all children and adolescents under age 20 increased, with a statistically significant average annual increase for all races and both genders combined (EAPC 1.1 p<0.05). A significant positive increase, total 21.4 percent, occurred among males (EAPC 2.9 p=0.03), but not females (EAPC -1.2 p=0.25), over this 12-year period, 1988 to 1999, primarily due to the increasing incidence in 15 to 19 year-olds. Statistically significant changes in race-specific age-adjusted trends were observed in Hispanic males with a 60.6 percent increase (EAPC 6.4 p<0.01), and in non-Hispanic white females with a 36.8 percent decrease (EAPC -4.6 p=0.01). As with age-specific incidence, increases in gonadal

Figure 29
Annual Age-Adjusted Incidence of Gonadal Germ Cell Neoplasms (ICCC Xc) in California Children and Adolescents, Ages 0 to 19, by Race/Ethnicity, Both Sexes Combined (1988-1999)



*p<0.05
Prepared by the California Department of Health Services, Cancer Surveillance Section.

germ cell age-adjusted rates influenced these overall GCTOG increases, especially in Hispanics (EAPC 4.7 p=0.02) (Figure 29). Increases in the average annual age-adjusted incidence of testicular germ cell tumors among both Hispanics (EAPC 4.2 p=0.01) and non-Hispanic whites (EAPC 1.5 p=0.47), pushed this temporal rise in rates.

Carcinomas and Other Epithelial Cancers (ICCC XI)

Although carcinomas, or malignancies that initiate in epithelial tissues (such as malignancies of the breast, prostate, lung, and colon) are the most common type of adult tumors they, account for significantly fewer childhood tumors, less than four percent of all malignancies in children under age 15. However, incidence increases dramatically in adolescents, with carcinomas accounting for 19.6 percent of all malignancies in Californians ages 15 to 19. The ICCC scheme classifies carcinomas, excluding gonadal carcinomas (see ICCC X), into one of six categories, with the majority of cases arising in either the thyroid (ICCC XIb), the nasopharynx (ICCC XIc), at a variety of other anatomic sites (ICCC XIf), or as malignant melanomas (ICCC XId). Carcinomas of the thyroid accounted for 39.3 percent of all carcinomas, followed by malignant melanomas (21.9 percent), other carcinomas (18.6 percent), and nasopharyngeal carcinomas (3.5 percent). Other carcinomas assigned to ICCC category XIf included those diagnosed in the colon or rectum (3.8 percent), salivary glands (3.0 percent), other respiratory sites (2.1 percent), urinary bladder (1.1 percent), or cervix (1.0 percent).

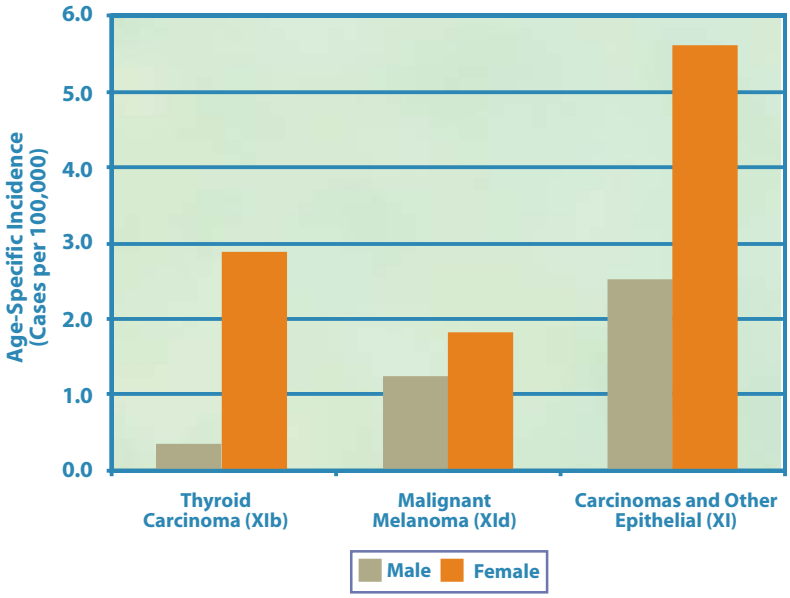
Since 1988, 1,000 new cases of malignant carcinoma and other epithelial tumors were diagnosed in California adolescents. In the most recent six-year period, 1994 to 1999, the overall ASIR was 3.95 cases per 100,000 adolescents (ages 15 to 19), with rates over two times greater among females than males, 5.53 versus 2.46 cases per 100,000, respectively. Sex-specific differences in age-specific incidence appeared greatest for thyroid carcinoma (XIb), with 88.6 percent of cases occurring in females, creating a rate over eight times

Table 6
Average Annual Age-Specific Incidence of Malignant Carcinomas and Other Epithelial Tumors in California Adolescents, Ages 15 to 19, by Select ICCC Category, Sex, and Race/Ethnicity (1994-1999)

		Total (ICCC XI)			Thyroid Carcinoma (XIb)			Malignant Melanoma (XIc)			Other Sites (XIf)		
		15-19 Years			15-19 Years			15-19 Years			15-19 Years		
		Cases	ASIR	SE	Cases	ASIR	SE	Cases	ASIR	SE	Cases	ASIR	SE
All Races Combined	Male	166	2.50	0.19	23	0.35	0.07	82	1.24	0.14	45	0.68	0.10
	Female	350	5.60	0.30	180	2.88	0.22	113	1.81	0.17	51	0.82	0.11
	Total	516	4.00	0.18	203	1.58	0.11	195	1.51	0.11	96	0.75	0.08
Non-Hispanic White	Male	93	3.09	0.32	8	--	--	58	1.93	0.25	20	0.67	0.15
	Female	199	7.10	0.50	90	3.21	0.34	89	3.18	0.34	17	0.61	0.15
	Total	292	5.03	0.29	98	1.69	0.17	147	2.53	0.21	37	0.64	0.10
Black	Male	6	--	--	<5	--	--	<5	--	--	<5	--	--
	Female	11	--	--	<5	--	--	<5	--	--	<5	--	--
	Total	17	1.64	0.40	6	--	--	<5	--	--	6	--	--
Hispanic	Male	36	1.59	0.26	11	--	--	5	--	--	16	0.71	0.18
	Female	91	4.21	0.44	60	2.78	0.36	8	--	--	21	0.97	0.21
	Total	127	2.87	0.25	71	1.60	0.19	13	--	--	37	0.84	0.14
Asian-Pacific Islander	Male	13	--	--	<5	--	--	<5	--	--	7	--	--
	Female	34	4.58	0.79	24	3.23	0.66	<5	--	--	7	--	--
	Total	47	3.09	0.45	28	1.84	0.35	<5	--	--	14	--	--

Cases=Number of new primary malignant cases initially diagnosed between January 1, 1994 and December 31, 1999, reported to CCR as of August 2001.
Age-specific incidence rate (ASIR)=Average annual age-specific incidence for the six-year period, 1994-1999, reported as cases per 100,000.
SE=Standard error for the ASIR.
Prepared by the California Department of Health Services, Cancer Surveillance Section.

Figure 30
Average Annual Age-Specific Incidence of Carcinomas and Other Epithelial Cancers in California Adolescents, Ages 15 to 19, by Sex, All Races Combined (1994-1999)



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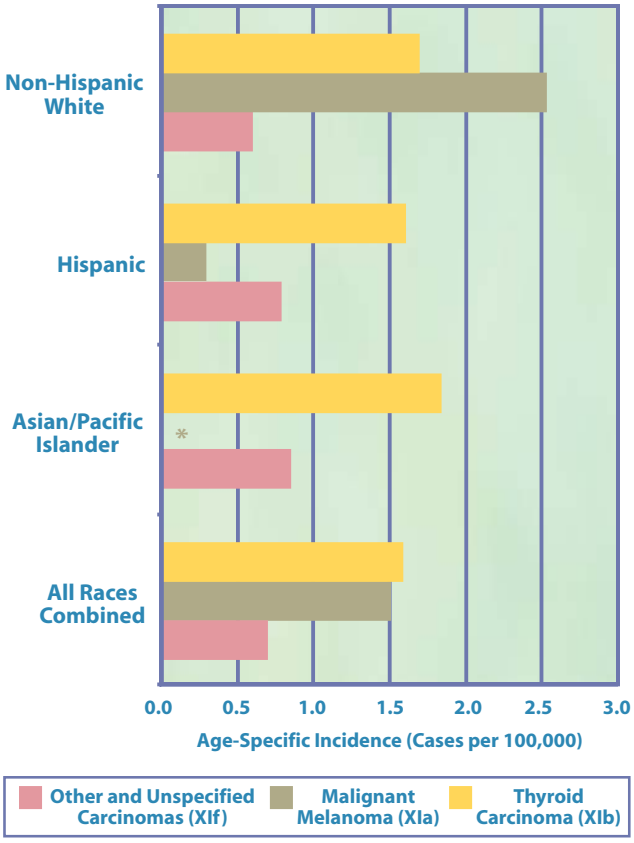
greater than the comparable male rate (2.88 versus 0.35 cases per 100,000). A female predominance also appeared for malignant melanoma (XId) but to a lesser degree, 1.81 versus 1.24 cases per 100,000 females and males, respectively. In the less common carcinomas, nasopharyngeal carcinoma (XIc) occurred predominately in males, and, conversely, salivary gland carcinoma in females (within ICCC XIf).

Additionally, overall carcinoma rates appeared highest in non-Hispanic whites and Asian/Pacific Islanders (4.97 and 3.09 cases per 100,000), followed by rates among Hispanics (2.87 cases per 100,000), due to the relative predominance of malignant melanoma and thyroid carcinoma in these groups. The relatively few cases reported among black adolescents (17 cases total) limited the ability to present incidence rates. The majority of malignant melanoma cases, 75.4 percent, appeared in non-Hispanic whites (2.53 cases per 100,000), with race- and age-specific incidence higher in females than males, 3.18 versus 1.93 cases per 100,000. Adolescent Asian/Pacific Islander and non-Hispanic white females had the highest incidence of thyroid carcinoma, at 3.23 and 3.21 cases per 100,000, with lower rates in Hispanics (2.78 cases per 100,000), and fewer than ten cases reported among black females.

Figure 31

Average Annual Age-Specific Incidence of Carcinomas and Other Epithelial Cancers by ICCC Subtype in California Adolescents, Ages 15 to 19, by Race/Ethnicity, Both Sexes Combined (1994-1999)



* < 5 cases
Prepared by the California Department of Health Services, Cancer Surveillance Section.

In the 12-year period 1988 to 1999, no statistically significant change in the overall age-specific incidence of carcinomas and other epithelial cancers has occurred in California adolescents (EAPC 0.7 p=0.55), with an average annual downward incidence in males (EAPC -0.9 p=0.38) and upward incidence in females (EAPC 1.3 p=0.31). Although limited by relatively small numbers, changes in age-specific trends for the most common ICCC carcinoma subgroups were generally not statistically significant. Figure 32 illustrates trends in the average annual age-specific incidence of thyroid carcinoma in adolescent females by race. No group averaged a substantial

Figure 32

Annual Age-Specific Incidence of Female Thyroid Cancer (XIb) in California Adolescents, Ages 15 to 19, by Race/Ethnicity (1998-1999)

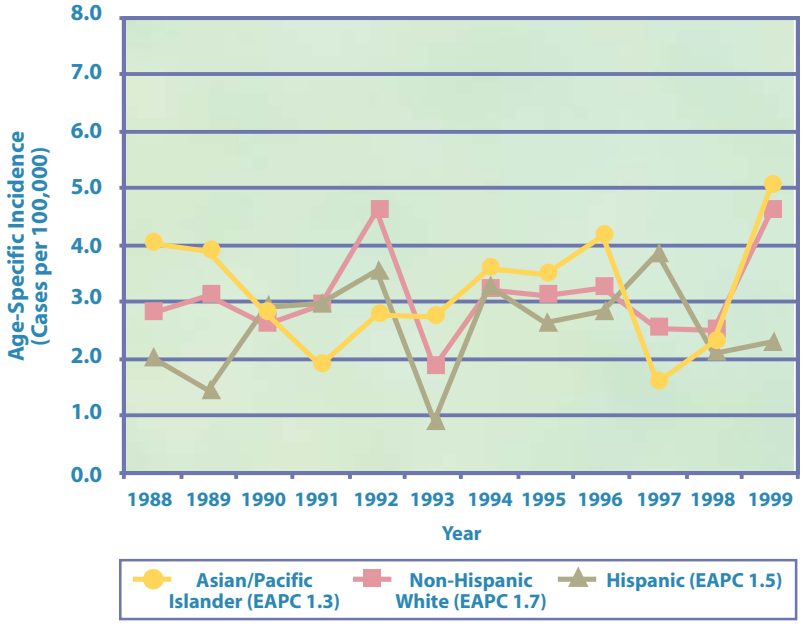


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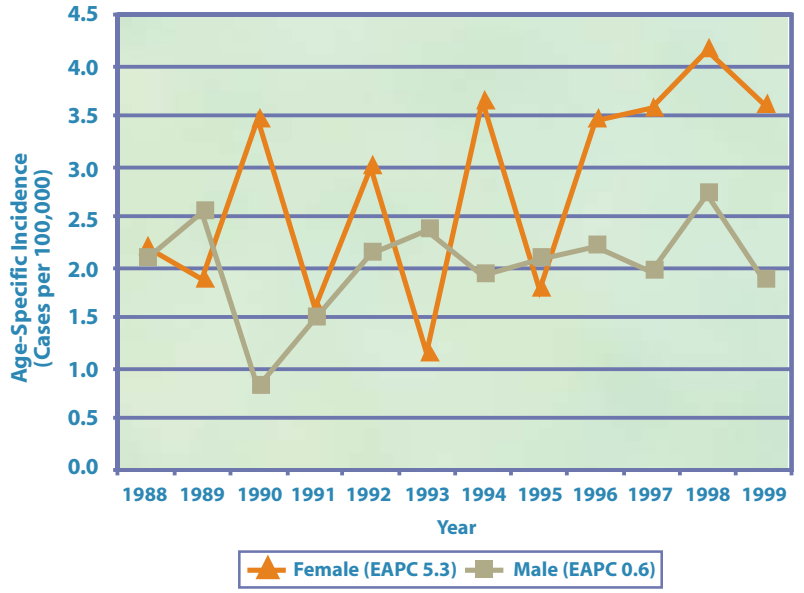
Figure 33

Annual Age-Specific Incidence of Malignant Melanoma (XId) in California Adolescents, Ages 15 to 19, by Sex, Non-Hispanic Whites (1998-1999)



Prepared by the California Department of Health Services, Cancer Surveillance Section.

change since 1988. However, in non-Hispanic whites, the overall incidence of malignant melanoma did increase significantly (EAPC 3.9 p=0.02), particularly due to rates in females, 90.1 percent total increase (EAPC 5.3 p=0.06) (Figure 33).

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Appendix A

International Classification of Childhood Cancer (ICCC)[1]

I. Leukemia

a. Lymphoid leukemia
b. Acute non-lymphocytic leukemia
c. Chronic myeloid leukemia
d. Other specified leukemia
e. Unspecified leukemia

II. Lymphomas and Other Reticuloendothelial Neoplasms

a. Hodgkin's disease
b. Non-Hodgkin's disease
c. Burkitt's lymphoma
d. Other reticuloendothelial neoplasms
e. Unspecified lymphomas

III. Central Nervous System and Miscellaneous Intracranial and Intraspinal Neoplasms

a. Ependymoma
b. Astrocytoma
c. Primitive neuroectodermal tumors
d. Other gliomas
e. Miscellaneous intracranial and intraspinal neoplasms
f. Unspecified intracranial and intraspinal neoplasms

IV. Sympathetic Nervous System Tumors

a. Neuroblastoma and ganglioneuroblastoma
b. Other sympathetic nervous system tumors

V. Retinoblastoma

VI. Renal Tumors

a. Wilms' tumor, rhabdoid and clear cell sarcoma
b. Renal carcinoma
c. Unspecified malignant renal tumors

VII. Hepatic Tumors

a. Hepatoblastoma
b. Hepatic carcinoma
c. Unspecified malignant hepatic tumors

VIII. Malignant Bone Tumors

a. Osteosarcoma
b. Chondrosarcoma
c. Ewing's sarcoma
d. Other specified malignant bone tumors
e. Unspecified malignant bone tumors

IX. Soft Tissue Sarcomas

a. Rhabdomyosarcoma and embryonal sarcoma
b. Fibrosarcoma, neurofibrosarcoma and other neurofibromatous neoplasms
c. Kaposi's sarcoma
d. Other specified soft-tissue sarcomas
e. Unspecified soft-tissue sarcomas

X. Germ Cell, Trophoblastic and Other Gonadal Neoplasms

a. Intracranial and intraspinal germ cell tumors
b. Other and unspecified non-gonadal germ cell tumors
c. Gonadal germ cell tumors
d. Gonadal carcinomas
e. Other and unspecified malignant gonadal tumors

XI. Carcinomas and Other Malignant Epithelial Neoplasms

a. Adrenocortical carcinoma
b. Thyroid carcinoma
c. Nasopharyngeal carcinoma
d. Malignant melanoma
e. Skin carcinoma
f. Other and unspecified carcinomas

XII. Other and Unspecified Malignant Neoplasms
a. Other specified malignant tumors
b. Other unspecified malignant tumors

1. Kramarova E and Stiller CA. The International Classification of Childhood Cancer. *Int J Cancer* 1996;68:759-765.

Appendix B
Adolescent Cancer Case Counts and Average Annual ASIR by Selected ICCC Category/ Subcategory (Ages 15-19), by Sex, and Major ICCC Category, All Races Combined, in California, 1994-1999

Cancer Type	Sex	1994-1999 15-19 Years Cases	ASIR	SE	Cancer Type	Sex	1994-1999 15-19 Years Cases	ASIR	SE
All Cancers	Male	1,450	21.86	0.57	III.a. Ependymoma	Male	12	--	--
	Female	1,183	18.92	0.55		Female	10	--	--
	Total	2,633	20.44	0.40		Total	22	0.17	0.04
I. Leukemia	Male	248	3.74	0.24	III.b. Astrocytoma	Male	82	1.24	0.14
	Female	140	2.24	0.19		Female	56	0.90	0.12
	Total	388	3.01	0.15		Total	138	1.07	0.09
I.a. Acute Lymphocytic	Male	159	2.40	0.19	III.c. Primitive Neuroectodermal	Male	29	0.44	0.08
	Female	79	1.26	0.14		Female	19	0.30	0.07
	Total	238	1.85	0.12		Total	48	0.37	0.05
I.b. Acute Non-Lymphocytic	Male	56	0.84	0.11	III.d. Other Gliomas	Male	17	0.26	0.06
	Female	34	0.54	0.09		Female	9	--	--
	Total	90	0.70	0.07		Total	26	0.20	0.04
I.c. Chronic Myeloid	Male	32	0.48	0.09	III.e. Miscellaneous Specified	Male	5	--	--
	Female	23	0.37	0.08		Female	<5	--	--
	Total	55	0.43	0.06		Total	8	--	--
I.d. Other Specified	Male	11	--	--	III.f. Unspecified	Male	<5	--	--
	Female	8	--	--		Female	<5	--	--
	Total	19	0.15	0.03		Total	<5	--	--
I.e. Unspecified	Male	<5	--	--	IV. Sympathetic Nervous System	Male	7	--	--
	Female	5	--	--		Female	<5	--	--
	Total	8	--	--		Total	11	--	--
II. Lymphoma and Other Reticuloendothelial	Male	287	4.33	0.26	V. Retinoblastoma	Male	--	--	--
	Female	246	3.93	0.25		Female	--	--	--
	Total	533	4.14	0.18		Total	--	--	--
II.a. Hodgkin's Disease	Male	161	2.43	0.19	VI. Renal	Male	7	--	--
	Female	186	2.97	0.22		Female	5	--	--
	Total	347	2.69	0.14		Total	12	--	--
II.b. Non-Hogkin's Disease	Male	104	1.57	0.15	VII. Hepatic Tumors	Male	11	--	--
	Female	51	0.82	0.11		Female	11	--	--
	Total	155	1.20	0.10		Total	22	0.17	0.04
II.c. Burkitt's Lymphoma	Male	14	--	--	VII.a. Hepatoblastoma	Male	<5	--	--
	Female	<5	--	--		Female	<5	--	--
	Total	16	0.12	0.03		Total	<5	--	--
II.d. Miscellaneous Lymphoreticular	Male	<5	--	--	VII.b. Hepatic Carcinoma	Male	5	--	--
	Female	<5	--	--		Female	<5	--	--
	Total	<5	--	--		Total	9	--	--
II.e. Unspecified	Male	7	--	--	VIII. Malignant Bone	Male	137	2.07	0.18
	Female	7	--	--		Female	63	1.01	0.13
	Total	14	--	--		Total	200	1.55	0.11
III. Central Nervous System	Male	154	2.32	0.19	VIII.a. Osteosarcoma	Male	35	1.16	0.20
	Female	106	1.70	0.16		Female	40	0.64	0.10
	Total	260	2.02	0.13		Total	124	0.96	0.09

Data presented for major ICCC categories and selected subcategories.
ASIR=average annual age-specific incidence rates per 100,000 for the six-year period. SE=Standard error. Rates based on fewer than 15 cases over this six-year period are not shown.
Prepared by the California Department of Health Services, Cancer Surveillance Section.

Appendix B

Adolescent Cancer Case Counts and Average Annual ASIR by Selected ICCC Category/ Subcategory (Ages 15-19), by Sex, and Major ICCC Category, All Races Combined, in California, 1994-1999

Cancer Type	Sex	1994-1999 15-19 Years Cases	ASIR	SE
VIII.b. Chondrosarcoma	Male	6	--	--
	Female	<5	--	--
	Total	9	--	--
VIII.c. Ewing's Sarcoma	Male	38	0.57	0.09
	Female	12	--	--
	Total	50	0.39	0.05
VIII.d. Other specified	Male	7	--	--
	Female	8	--	--
	Total	15	0.12	0.03
VIII.e. Unspecified	Male	<5	--	--
	Female	<5	--	--
	Total	<5	--	--
IX. Soft Tissue Sarcoma	Male	121	1.82	0.17
	Female	78	1.25	0.14
	Total	199	1.54	0.11
IX.a. Rhabdomyosarcoma and Embryonal	Male	31	0.47	0.08
	Female	15	0.24	0.06
	Total	46	0.36	0.05
IX.b. Fibrosarcoma and Neurofibrosarcoma	Male	37	0.56	0.09
	Female	24	0.38	0.08
	Total	61	0.47	0.06
IX.d. Other Specified	Male	34	0.51	0.09
	Female	27	0.43	0.08
	Total	61	0.47	0.06
IX.e. Unspecified	Male	17	0.26	0.06
	Female	12	--	--
	Total	29	0.23	0.04
X. Germ Cell, Trophoblastic, and Other Gonadal	Male	294	4.43	0.26
	Female	153	2.45	0.20
	Total	447	3.47	0.16
X.a. Intracranial and Intraspinal	Male	28	0.42	0.08
	Female	6	--	--
	Total	34	0.26	0.05
X.b. Other/Unspecified Non-Gonadal	Male	17	0.26	0.06
	Female	15	0.24	0.06
	Total	32	0.25	0.04
X.c. Gonadal Germ Cell Tumors	Male	244	3.68	0.24
	Female	78	1.25	0.14
	Total	322	2.50	0.14
X.d. Gonadal Carcinomas	Male	<5	--	--
	Female	50	0.80	0.11
	Total	53	0.41	0.06
X.e. Other and Unspecified Gonadal Neoplasms	Male	<5	--	--
	Female	<5	--	--
	Total	6	--	--
XI. Epithelial and Other Carcinomas	Male	166	2.50	0.19
	Female	350	5.60	0.30
	Total	516	4.00	0.18
XI.b. Thyroid Carcinoma	Male	23	0.35	0.07
	Female	180	2.88	0.21
	Total	203	1.58	0.11
XI.c. Nasopharyngeal Carcinoma	Male	15	0.23	0.06
	Female	<5	--	--
	Total	18	0.14	0.03
XI.d. Malignant Melanoma	Male	82	1.24	0.14
	Female	113	1.81	0.17
	Total	195	1.51	0.11
XI.f. Other/Unspecified Carcinoma	Male	45	0.68	0.10
	Female	51	0.82	0.11
	Total	96	0.75	0.08
XII. Other and Unspecified Malignancies	Male	<5	--	--
	Female	18	0.288	0.068
	Total	22	0.171	0.036

Data presented for major ICCC categories and selected subcategories.
ASIR=average annual age-specific incidence rates per 100,000 for the six-year period. SE=Standard error. Rates based on fewer than 15 cases over this six-year period are not shown.
Prepared by the California Department of Health Services, Cancer Surveillance Section.

Appendix C
Adolescent Cancer Six-Year Case Counts and Average Annual AAIR (Ages Birth-19), 1994-1999, with Twelve-Year Trends, by Major ICCC Category, Sex and Race/Ethnicity, in California, 1988-1999

		Non-Hispanic White 1994-1999 0-19 Years			Black 1994-1999 0-19 Years			Hispanic 1994-1999 0-19 Years		
Cancer Type	Sex	Cases	AAIR	SE	Cases	AAIR	SE	Cases	AAIR	SE
All Cancers	Male	2,133	16.77	0.36	300	12.88	0.75	2,026	16.87	0.39
	Female	1,767	14.78	0.35	268	11.95	0.73	1,655	14.46	0.37
	Total	3,900	15.80	0.25	568	12.42	0.52	3,681	15.69	0.27
I. Leukemia	Male	550	4.24	0.18	68	2.84	0.35	769	6.06	0.22
	Female	442	3.62	0.17	55	2.39	0.32	557	4.49	0.20
	Total	992	3.94	0.13	123	2.62	0.24	1,326	5.29	0.15
II. Acute Lymphocytic	Male	411	3.16	0.16	43	1.79	0.27	626	4.87	0.20
	Female	327	2.66	0.15	32	1.39	0.25	443	3.49	0.17
	Total	738	2.91	0.11	75	1.59	0.18	1,069	4.19	0.13
III. Lymphoma and Other Reticuloendothelial	Male	315	2.53	0.14	51	2.26	0.32	260	2.40	0.15
	Female	208	1.79	0.12	33	1.56	0.27	161	1.66	0.13
	Total	523	2.17	0.10	84	1.92	0.21	421	2.04	0.10
IV. Central Nervous System	Male	426	3.30	0.16	66	2.81	0.35	269	2.17	0.14
	Female	324	2.66	0.15	55	2.38	0.32	235	1.93	0.13
	Total	750	2.99	0.11	121	2.60	0.24	504	2.05	0.09
V. Sympathetic Nervous System	Male	104	0.79	0.08	13	--	--	88	0.59	0.06
	Female	86	0.69	0.07	13	--	--	60	0.43	0.06
	Total	190	0.74	0.05	26	0.52	0.10	148	0.51	0.04
VI. Retinoblastoma	Male	40	0.31	0.05	9	--	--	65	0.41	0.05
	Female	33	0.27	0.05	9	--	--	47	0.31	0.04
	Total	73	0.29	0.03	18	0.35	0.08	112	0.36	0.03
VII. Renal	Male	72	0.55	0.06	8	--	--	56	0.37	0.05
	Female	84	0.68	0.07	24	0.99	0.20	80	0.55	0.06
	Total	156	0.61	0.05	32	0.65	0.12	136	0.46	0.04
VIII. Hepatic Tumors	Male	14	--	--	<5	--	--	22	0.15	0.03
	Female	22	0.18	0.04	<5	--	--	21	0.16	0.03
	Total	36	0.15	0.02	<5	--	--	43	0.15	0.02
IX. Malignant Bone	Male	130	1.05	0.09	21	0.97	0.21	82	0.82	0.09
	Female	86	0.73	0.08	9	--	--	71	0.73	0.09
	Total	216	0.89	0.06	30	0.71	0.13	153	0.78	0.06
X. Soft Tissue Sarcoma	Male	144	1.14	0.09	32	1.41	0.25	127	1.11	0.10
	Female	102	0.86	0.09	26	1.20	0.24	112	0.98	0.10
	Total	246	1.00	0.06	58	1.30	0.17	239	1.05	0.07
XI. Germ Cell, Trophoblastic, and Other Gonadal	Male	171	1.40	0.11	13	--	--	187	1.87	0.14
	Female	85	0.73	0.08	26	1.25	0.25	131	1.36	0.12
	Total	256	1.08	0.07	39	0.90	0.14	318	1.63	0.09
XII. Epithelial and Other Carcinomas	Male	139	1.14	0.10	13	--	--	57	0.59	0.08
	Female	262	2.30	0.14	14	--	--	134	1.46	0.13
	Total	401	1.70	0.08	27	0.64	0.12	191	1.02	0.07
XIII. Other and Unspecified Malignancies	Male	5	--	--	<5	--	--	<5	--	--
	Female	9	--	--	<5	--	--	10	--	--
	Total	14	--	--	<5	--	--	15	0.07	0.02

AAIR=average annual incidence rates per 100,000 for the six-year period age-adjusted to the 2000 U.S. Standard Population.
SE=Standard error. Rates based on fewer than 15 cases over this six-year period are not shown.
EAPC*=Estimated annual percent change over twelve-year period, 1988-1999. EAPCs considered statistically significant if P values for trend < 0.05. EAPCs not presented for major ICCC categories with fewer than 25 cases over the twelve-year period.
Prepared by the California Department of Health Services, Cancer Surveillance Section.

Appendix C

Adolescent Cancer Six-Year Case Counts and Average Annual AAIR (Ages Birth-19), 1994-1999, with Twelve-Year Trends, by Major ICCC Category, Sex and Race/Ethnicity, in California, 1988-1999

			Asian/Pacific Islander 1994-1999 0-19 Years			All Races Combined 1994-1999 0-19 Years			1988-1999 12-Year Trend AAIR	
Cancer Type		Sex	Cases	AAIR	SE	Cases	AAIR	SE	EAPC*	P
All Cancers		Male	436	12.73	0.61	4,991	16.25	0.23	0.1	0.80
		Female	388	11.94	0.61	4,157	14.29	0.22	-0.7*	0.03
		Total	824	12.34	0.43	9,148	15.30	0.16	-0.3	0.23
I.	Leukemia	Male	150	4.26	0.35	1,552	4.84	0.12	0.9	0.12
		Female	102	3.02	0.30	1,169	3.80	0.11	0.4	0.53
		Total	252	3.66	0.23	2,721	4.33	0.08	0.7	0.14
II.	Acute Lymphocytic	Male	105	2.92	0.29	1,198	3.70	0.11	0.7	0.34
		Female	70	2.06	0.25	882	2.82	0.10	0.9	0.24
		Total	175	2.50	0.19	2,080	3.27	0.07	0.8	0.22
III.	Lymphoma and Other Reticuloendothelial	Male	52	1.57	0.22	694	2.40	0.09	-0.8	0.36
		Female	39	1.26	0.20	451	1.69	0.08	-0.9	0.41
		Total	91	1.42	0.15	1,145	2.05	0.06	-0.9	0.22
IV.	Central Nervous System	Male	56	1.64	0.22	832	2.66	0.09	-0.3	0.76
		Female	51	1.58	0.22	673	2.25	0.09	-1.6*	0.02
		Total	107	1.61	0.16	1,505	2.46	0.06	-0.9	0.13
V.	Sympathetic Nervous System	Male	26	0.69	0.14	237	0.68	0.04	-1.5	0.13
		Female	14	--	--	178	0.54	0.04	-2.0	0.26
		Total	40	0.54	0.09	415	0.61	0.03	-1.7	0.07
VI.	Retinoblastoma	Male	11	--	--	128	0.36	0.03	1.7	0.53
		Female	10	--	--	104	0.30	0.03	0.2	0.89
		Total	21	0.28	0.06	232	0.33	0.02	1.0	0.54
VII.	Renal	Male	6	--	--	144	0.42	0.03	-3.1	0.10
		Female	17	0.47	0.11	206	0.62	0.04	-2.4	0.16
		Total	23	0.31	0.07	350	0.52	0.03	-2.6*	0.00
VIII.	Hepatic Tumors	Male	12	--	--	51	0.16	0.02	-5.7*	0.03
		Female	8	--	--	52	0.17	0.02	-1.5	0.65
		Total	20	0.30	0.07	103	0.16	0.02	-3.3	0.06
IX.	Malignant Bone	Male	24	0.75	0.15	281	0.96	0.06	-0.5	0.73
		Female	18	0.59	0.14	131	0.48	0.04	-3.0*	0.05
		Total	42	0.67	0.10	412	0.72	0.04	-1.6	0.16
X.	Soft Tissue Sarcoma	Male	35	1.06	0.18	343	1.14	0.06	0.5	0.48
		Female	20	0.62	0.14	267	0.93	0.06	-1.3	0.37
		Total	55	0.85	0.11	610	1.04	0.04	-0.4	0.67
XI.	Germ Cell, Trophoblastic, and Other Gonadal	Male	40	1.20	0.19	418	1.49	0.07	2.9*	0.03
		Female	57	1.80	0.24	302	1.11	0.06	-1.2	0.25
		Total	97	1.49	0.15	720	1.31	0.05	1.1*	0.05
XII.	Epithelial and Other Carcinomas	Male	19	0.60	0.14	250	0.91	0.06	-0.9	0.47
		Female	45	1.50	0.22	477	1.85	0.09	0.8	0.48
		Total	64	1.04	0.13	727	1.37	0.05	0.2	0.83
XIII.	Other and Unspecified Malignancies	Male	<5	--	--	11	--	--	--	--
		Female	<5	--	--	26	0.10	0.02	1.8	0.67
		Total	<5	--	--	37	0.07	0.01	1.3	0.69

AAIR=average annual incidence rates per 100,000 for the six-year period age-adjusted to the 2000 U.S. Standard Population.
SE=Standard error. Rates based on fewer than 15 cases over this six-year period are not shown.
EAPC*=Estimated annual percent change over twelve-year period, 1988-1999. EAPCs considered statistically significant if P values for trend < 0.05. EAPCs not presented for major ICCC categories with fewer than 25 cases over the twelve-year period.
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