Cancer Assessments in Chino Hills

Summary

In June 1999, a resident of Chino Hills telephoned the regional cancer epidemiologist with a concern about neuroblastoma, a rare childhood cancer. Shortly after the initial telephone call, other residents raised concerns about possible toxic substance exposures from the AeroJet Ordinance facility in Chino Hills. In response to the community concern, steps were initiated to determine the numbers of observed and expected neuroblastoma cases within the Chino Hills population from 1988-1998. Additional assessments were made for childhood cancer (1988-1996) and for all cancers combined (1990-1996) in the same community. The numbers of cancer cases observed within the Chino Hills population were obtained through a query of the regional cancer registry database. Estimation of the number of neuroblastoma cases expected within the Chino Hills population was computed by applying the national incidence of neuroblastoma to the age-composition of Chino Hills. Public school enrollment figures identified a 60% increase in the number of elementary school children (K6th grade) in Chino Hills schools between 1990 and 1996; 75% increase by 1998. City census figures identified an estimated 80% increase in the size of the total population (all ages) from 1990-1996. The expected number of neuroblastoma cases was adjusted to reflect the increase in elementary school enrollment in Chino Hills schools relative to 1990. Similar estimates were made for all childhood cancers and for all cancers-in all age groups. In addition to age, these assessments also standardized the effects of gender and race/ethnicity utilizing 1990 census data. The ratios of the observed to expected numbers of new cancer cases were calculated, forming standardized incidence ratios (SIRS) for neuroblastoma, all childhood cancers, and all cancers combined. The SIRS and 99% confidence interval limits for SIRS were: neuroblastoma SJR=1.54 (0.10-5.55); all childhood cancers SIR=0.87 (0.39-1.61); and all cancers combined for all age-categories (SIR=1.06 (0.96-1.16). During the seven-year period assessed, the annual numbers of new cancers (all sites and all age groups combined) in the Chino Hills population increased from 80 to 129. This 61 % rise in the number of cases is less than the increase expected to result from the 80% population growth. These findings do not identify any excess or increase in numbers of neuroblastoma, childhood cancer, or all cancer (all age groups) cases in Chino Hills that are greater than the anticipated increase produced by population growth. Although cancer surveillance in Chino Hills will continue, these findings do not support the need to target this community with cancer control and prevention programs beyond those that are appropriate for the entire region.

Introduction:

The Desert Sierra Cancer Surveillance Program (DSCSP) is the regional cancer registry that covers Inyo, Mono, Riverside, and San Bernardino Counties. By law, all cancers diagnosed in California since January 1, 1988 are reported to one of the regional registries that form the California Cancer Registry (CCR), the legally

mandated cancer reporting system of California. The DSCSP serves as Region 5 of the CCR.

Included in the information reported for each cancer case are the precise type of cancer and the address of the subject at the time of diagnosis. This information makes it possible to assess specific types of cancers diagnosed within the population of a geographic area and to compare them to the number of cancer cases that would have been expected to occur if the population experienced the same cancer rate as the entire region. The length of residence at that location and previous residences are not available in the cancer registry database. Studies of occupational cancers have shown an average latency period of about 20 years between carcinogenic exposure and the manifestation of clinically diagnosable cancer, although there is a range of less than two years to more than 40 years. If past exposures convey an increase in cancer risk, many of the people who were exposed could have moved out of an area before developing cancer. Cancer concerns frequently relate to recent diagnoses, while cancer incidence data on recently diagnosed cases are usually not available. The extensive quality control procedures and time required to confirm cancer diagnoses creates a lag period of up to two years before CCR data for a given year are complete. In spite of these limitations, many neighborhoods have a sufficient number of long-term residents to allow detection of a substantial increase in the number of cancer cases if it occurs.

Problem:

In June 1999, a resident of Chino Hills, San Bernardino County, telephoned the regional cancer epidemiologist with a concern about neuroblastoma, a rare childhood cancer. Subsequent telephone calls from other residents of Chino Hills identified a concern stemming from potential exposures to toxic substances that may have been released from the AeroJet Ordinance facility located in Chino Hills (formerly having Chino address).

AeroJet Ordinance:

Articles in local newspapers linking the AeroJet Ordinance facility to cancer cases reflected the high level of community concern about cancer. Several residents who contacted the regional cancer registry described Chino Hills town hall meetings that had discussed toxic substance exposures emanating from the AeroJet Ordinance facility and concerns about excess numbers of childhood cancer. The level of community concern reflected by numerous telephone calls received by the regional cancer epidemiologist identified the need to expand the assessment beyond neuroblastoma, to also include all childhood cancers and all cancers, regardless of age.

Expansion:

In early June 1999, the DSCSP epidemiologist initiated an assessment to identify all neuroblastoma cases diagnosed among Chino Hills residents between

January 1, 1988 and December 3 1, 1996. Because of the rarity of neuroblastoma and the limited number of treatment facilities, it was possible to implement an informal rapid case ascertainment for neuroblastoma cases diagnosed after December 31, 1996, extending the period of assessment through 1998.

In June/July 1999, basic assessments similar to that described for neuroblastoma were initiated for all childhood (less than "15 years of age) cancers and for all cancer types combined (all age groups). The rapid Case ascertainment methods used for neuroblastoma were impractical for all childhood cancer cases and for all Cancers in all age-groups, restricting assessments to 1988-1996 (childhood cancers) and 19901996 (cancer in all age-groups).

Methods:

The Desert Sierra Cancer Surveillance Program staff reviewed cancer cases that had been diagnosed among Chino Hills residents. These cases were reported to the regional cancer registry, as mandated by California Health & Safety Code section 103885.

The number of neuroblastoma cancer cases that would be expected to occur among residents of Chino Hills during 1990 was estimated by applying age-specific incidence rates observed nationally; using the population Size and demographic information for the two census-tracts forming Chino Hills that was available in the 1990 census. Similar methods were used for all childhood cancers and for all cancers in all age groups using age, gender, and race/ethnicity-specific incidence rates for the region. Due to the interval often years between censuses, it is not possible to generate completely satisfactory estimates of the expected numbers of new cancer cases among residents of a particular census tract for non-census years. The annual expected numbers of new cancer cases were computed by adjusting the 1990 expected numbers using annual school enrollment figures (neuroblastoma and childhood cancer) or city growth estimates (all cancers) for the appropriate time-periods. Although this method compensates for growth in the size of the Chino Hills population, it does not take into account changes in the age, gender, of race/ethnicity composition of the population.

Dividing the observed number of new cancer cases by the number expected forms a ratio. This ratio is known as the standardized incidence ratio (SIR). With the SIR, a value of one (1.00) indicates that the number of observed cases is identical to the number expected. An SIR that is less than one identifies a smaller number of observed cases than the number expected, while an SIR that is larger than one signifies more observed cases than the number expected.

Variations in the number of cancer cases, within a population of a given size and configuration, are anticipated, even if cancer cases are unrelated. Depending upon the size of the population and the frequency of new cases, random variation will produce slight differences in the ratio of observed to expected cancer cases. When the number of cases is small, SRS can attain a magnitude of two to three without

indicating an excess number of cancer cases. Comparisons of the observed and expected numbers of cancer cases and the SIRS that they form frequently include confidence interval limits (CI) to depict the range of values in which random variation is anticipated.

Results:

Chino Hills exhibited a 60% increase •in elementary school enrollment between 1990 and 1996, with a 75% increase in enrollment measured between 1990 and 1998. By 1996, the entire Chino Hills population had grown by approximately 80% since 1990.

The ratio of the number of new cancer cases observed to the number that is expected (STR) and 99% confidence interval limits for SRS are provided in Table 1. Findings are divided into three categories that include neuroblastoma (1988-1998), childhood cancer (1988-1996), and all cancer types in all age groups (1990-1996). These results compensate for population growth in Chino Hills, but do not consider changes in the demographic configuration of the city since the 1990 census.

Table 1: Ratio of the number of observed (O) to expected (E) new cancer cases (SIR) and 99% confidence interval limits (99% CD for SIRs for neuroblastoma (1988-1998), all childhood cancers (1988-1996), and all cancers in all age groups (1990-1996).

Cancer Cases	**O/E**	**SIR**	**99% for SIR**
Neuroblastoma	*	1.54	0.10-5.55
All Childhood Cancers	15/17.3	0.87	0.39-1.61
All Cancers in All Age Groups	784/740	1.06	0.96-1.16

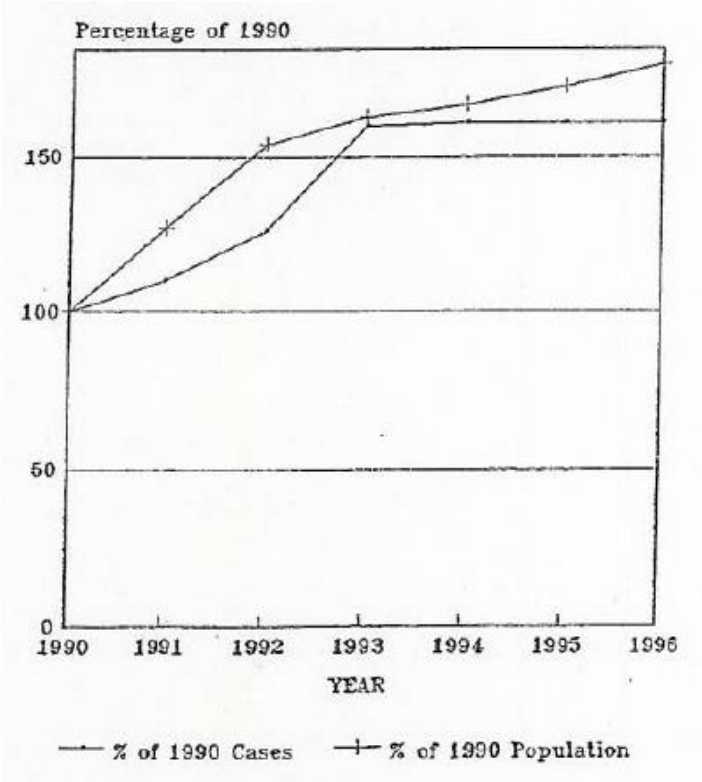
*The observed number of cases was less than 5 and is not reported to ensure the anonymity of cases.

During the periods of inquiry, there was no evidence of increases in the annual numbers of neuroblastoma or all childhood cancer cases. The annual numbers of cancer cases in all age groups combined (1990-1996) and percentages of the number of cases in 1990 are provided in Table 2. Figure I plots trends in the percentages of 1990 new cancer cases for all age groups and Chino Hills population estimates.

Table 2: Annual number of new cancer -cases (all sites combined) and percentage of 1990 cases by year, 1990-1996.

Year	**No. Cases**	**%1990 Cases**
1990	80	100%
1991	88	110%
1992	101	126%
1993	128	160%
1994	129	161%
1995	129	161%
1996	129	161%
Total No. Cases:	**784**	

Figure 1: Plot of annual increases in 1990 percentages of new cancer cases and population size 1990-1996.



Conclusion:

The SIR for neuroblastoma was 1.54, with 99% confidence interval limits of 0.10 to 5.55. The SIR for all childhood cancers was 0.87, with 99% confidence interval limits of 0.39 to 1.61, while the SIR for all cancers in all age groups was 1.06, with 99% confidence limits from 0.96 to 1.16. These findings do not identify numbers of observed cancer cases that are significantly above or below the numbers expected when population features, growth characteristics, and random measurement error are considered. There was no evidence of increases in the numbers of neuroblastoma cases (1988-1998) or all childhood cancer cases (1988-1996) in the Chino Hills population during the time-periods assessed. The 61% increase in the number of new cancer cases among residents of Chino Hills (Table 2) between 1990 and 1996 is slightly less than the increase that would be expected to result from the estimated 80% increase in the size of the population. The results for all cancers combined does not identify excesses or deficits in the number of new cancer cases beyond what can be reasonably accounted for by population changes and random variation in measurement. These findings do not support the need to target the population residing in Chino Hills for cancer control and prevention programs beyond those that are appropriate for the four counties.

Discussion:

The cancer assessments conducted in Chino Hills failed to identify any excess in neuroblastoma, childhood cancer, or all cancer types combined for all age groups. Although each assessment considered changes in the size of the populations at risk of developing cancer, no data were available that could be used to compensate for changes in the age, gender, and race/ethnicity composition of the Chino Hills population following the 1990 census. In spite of this limitation, it seems reasonable to assume that these changes were slight and would not appreciably affect the results of these assessments.

Cancer concern assessment is a cooperative process that involves the California Cancer Registry, County Health Department, hospitals, health professionals, and community sentinels. Cancer surveillance in Chino Hills will continue, as will surveillance throughout Inyo, Mono, Riverside, and San Bernardino Counties. For information on cancer early detection, treatment, hospice, support groups, risk factors, and research, you may find it helpful to contact Arturo (Art) Bobian, Executive Director of the Desert Sierra Region of the American Cancer Society at (909) 320-7142 Extension 216. Please contact Dr. Morgan if you have questions about this assessment.

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