Childhood Osteosarcoma Cancer Cluster Investigation
West Salem, Polk County Oregon, 2008-2012

Final Report

November 2014

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BACKGROUND

Osteosarcoma is a rare bone cancer with highest rates among children and adolescents.[1] Incidence is elevated in teens (when bone growth is most intense), and in children with other underlying bone diseases. Most cases of osteosarcoma occur without a clear cause.[2] Exposure to ionizing radiation, (e.g radiation treatment for other types of cancer) and certain types of chemotherapy have been associated with an increased risk of osteosarcoma, and genetics sometimes play a role.[2-4] No environmental contaminants are known to be associated with osteosarcoma. Other than radiation and chemotherapy, there are no known lifestyle-related or environmental causes of osteosarcoma.[2,4]

In the fall of 2012, the news media reported on a possible cluster of childhood osteosarcoma cases that had occurred in the West Salem area over the preceding five-year period. The news reports prompted the Oregon Health Authority's Public Health Division (PHD) to investigate these cases. The PHD's Oregon State Cancer Registry (OSCaR) reviewed community reports and assessed cases that had been reported to the registry.

In response to a petition from members of the community, the Environmental Protection Agency initiated an environmental assessment of the West Salem area in April 2013 to attempt to identify any potential environmental issues that might increase cancer risks and require environmental cleanup.

The Oregon Health Authority worked in partnership with the Environmental Protection Agency (EPA) to gather information, understand the specific concerns of the community, and identify geographic areas of environmental concern. This report summarizes the findings of the investigation.

EPIDEMIOLOGIC ANALYSES

The Oregon State Cancer Registry (OSCaR) reviewed its database for the 5-year period 2008–2012 to identify incident cases of osteosarcoma that had occurred among patients <25 years of age. Patients were assigned to county and US Census tract based on their residence on the date of diagnosis.

The Oregon State Cancer Registry initially analyzed osteosarcoma rates at the county level. Incorporating feedback from the community, OSCaR performed subsequent analyses that focused specifically on four contiguous census tracts that formed the main catchment area for West Salem High School. These census tracts included the sites identified by the EPA for environmental assessment: West Salem High School; Walker Middle School; Wallace Marine Park; Orchard Heights Park; and the 7th and Patterson Ballfields. In 2010, the population under 25 years of age in these Census tracts was 9,489.

To quantify the extent to which the rate in the area of interest was elevated, OSCaR performed statistical analyses comparing osteosarcoma rates for persons <25 years of age in the selected census tracts in the West Salem area to the expected rate in that area during the same time (reported as a Standardized Incidence Ratio or SIR). U.S. Census data from 2010 were used to calculate rates; the 2010 Oregon population (ages <25 years; pop. 1,225,231) was used as the referent population to estimate expected numbers of osteosarcoma cases for standardized incidence ratio (SIR) calculations.

During 2008–2012, 34 new osteosarcoma cases were reported statewide among Oregonians <25 years of age, with 4 cases[*] reported in the four selected census tracts. The SIR for the area of interest was found to be elevated at 14.3 (95% confidence interval = 3.8, 36.6); however, because this was based only on a small number of cases, the precision of this estimate was found to be low (as reflected by the wide 95% C.I.). These results indicate that the rate of cases of osteosarcoma for the specified age group in the area of interest during 2008-2012 was higher than expected. However, there was insufficient information to determine if the number of cases observed could be attributed to a specific cause.

ENVIRONMENTAL PROTECTION AGENCY ASSESSMENT

Incorporating feedback from the community, the Environmental Protection Agency Region 10 identified four areas of focus for its assessment: West Salem High School; Walker Middle School; Wallace Marine Park; Orchard Heights Park; and the 7th and Patterson Ballfields. The EPA Preliminary Assessment report indicated that concentrations of contaminants identified in samples taken from sites in the West Salem

[*] While these data are reported here to improve information sharing with the community, counts of ≤10 are normally not reported by OSCaR, as they result in estimates that are not stable or reliable.

area were well below levels considered unhealthy under Oregon Department of Environmental Quality standards.

CONCLUSIONS

The results of these analyses indicate that the number of cases of osteosarcoma observed among people <25 years of age in the West Salem census tracts was higher than expected during 2008-2012; however, the information available was not sufficient to determine if the cases observed could be attributed to a specific cause.

The EPA environmental assessment of geographic areas of concern found potential contaminants of concern to be below levels considered unhealthy under Oregon Department of Environmental Quality standards.

The Public Heath Division reviewed national guidelines for investigating cancer clusters[5], and contacted an outside expert, Dr. Donald Austin, Professor at Oregon Health and Sciences University, for input on the science of investigating cancer clusters, and the ability (or inability) to find causes for these apparent clusters. Dr. Austin delineated that there are two distinct responses to cancer clusters: 1) a "health hazard" investigation to identify any possible carcinogenic contaminants in the environment; and 2) an in-depth study to determine previously unknown causes of a particular type of cancer. Dr. Austin agreed with the State Health Officer and Public Health director that the PHD, in conjunction with EPA, had completed the "health hazard" evaluation and exhausted all the investigative public health tools at their disposal. An in-depth study into previously unknown causes of osteosarcoma, likely involving a multi-state study with cases included from around the country, is beyond the scope of the PHD and OSCaR.

ADDITIONAL STUDY

An outside investigator, Chris Neurath, Research Director for the American Health Studies Project (http://www.americanhealthstudies.org/aboutus.html) contacted families of the affected children and offered to assess the situation. Using a specific set of assumptions, he concluded that the area in which these families live is experiencing a "forty-fold increase" in osteosarcoma rates compared to the rest of Oregon. This analysis was based on different assumptions and was higher than the OHA calculations (which showed a fourteen-fold increase).

Chris Neurath and Dr. Scott Burns (a geology professor from PSU) have proposed an ecologic study to examine osteosarcoma cases throughout the state of Oregon and their relationship to radon levels. This study has been approved by the OSCaR advisory committee and by the Public Health Division IRB to move forward.

NOVEMBER 2014 UPDATE

No new cases of osteosarcoma have been identified in the West Salem area since 2012. Updated analyses of osteosarcoma data for specific age groups show little

change in the rate of osteosarcoma cases compared to previous analyses. Of note, for rare diseases like osteosarcoma, a small change in the number of cases can make rates look different. There is no indication of a trend in the rate of osteosarcoma cases in Oregon over time. Rates for the overall population have generally been stable and comparable to rates in the U.S. since 2000.

FOR MORE INFORMATION

Data on statewide osteosarcoma, and the West Salem Osteosarcoma investigation are available on the Oregon Health Authority, Public Health Division website. See: https://public.health.oregon.gov/DiseasesConditions/ChronicDisease/Cancer/Pages/west-salem-osteosarcoma.aspx

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