Characteristics of Patients in a Postmarketing Osteosarcoma Surveillance Study

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ABSTRACT

Background: Adult osteosarcoma is extremely rare (approximately 3-5 cases per million population per year), and there is little population-based or large case series data reported in the literature. The conduct of an ongoing 10-year surveillance study evaluating potential medication exposures affords the opportunity to collect information in a large population-based series of adult osteosarcoma patients.

Objectives: To characterize the demographic, environmental, and treatment exposures in adult osteosarcoma patients according to tumor cell type from an ongoing surveillance study.

Methods: Incident cases of confirmed primary adult osteosarcoma diagnosed on or after January 1, 2003 are identified through population-based state cancer registries and comprehensive cancer center registries in the US. Once cases are identified and consent is obtained, possible prior treatment with teriparatide, (a self-injectable medication used daily to treat osteoporosis), demographics, and risk factor information is ascertained by patient or proxy telephone interview.

Results: Between June 2004 and December 2006, 430 cases were identified (estimated to be 37% of all adult cases in the US), and 124 cases had interview data. Interviewed cases were similar with regard to mean age, gender, race, and geographical distribution compared to noninterviewed cases. Among those interviewed, mean age was 60 years, 46% were female, 85% were white; and 76% were alive at time case reported to the registry. Osteosarcoma NOS (72%) and chondroblastic osteosarcoma (11%) were the most common morphology types; leg bones (24%) were the most common tumor site. Reported prevalence of possible risk factors was: 17% for prior trauma or infection at site of cancer, 10% for history of Paget's disease, and 19% for history of radiation treatment. Site of prior radiation treatment and site of tumor matched for 18/23 (78%) cases. There have been no valid reports of prior treatment with teriparatide use in this study.

Conclusions: Data from this ongoing surveillance study are adding to the general knowledge about adult patients with osteosarcoma. Results through the first 3 years support information from the literature and describe the distribution of risk factors among adult osteosarcoma patients from a population-based case series.

CONFLICT OF INTEREST

Eli Lilly and Company and RTI Health Solutions (RTI-HS) employees contributed significantly to the design and analysis plan for this study. Employees of RTI-HS, a nonprofit research organization, are collecting and analyzing data. Eli Lilly and Company is fully funding the Osteosarcoma Safety Surveillance Study. RTI-HS has an independent right to publish.

BACKGROUND

Incidence Rate

- Osteosarcoma is an extremely rare cancer:
  - Estimated US annual incidence for age 60 and older is 4 cases per million population (95% CI: 3,5);
  - Estimated US annual incidence for age 40 and older is 3 cases per million population (95% CI: 2,3).[1]

Incidence Distribution

- Osteosarcoma has a bimodal incidence rate distribution with the first peak in incidence occurring between 15 and 25 years of age and a second smaller peak occurring between 40 and 80 years of age.
- Potential risk factors include:
  - Family history,
  - Paget's disease,
  - Retinoblastoma,
  - Radiation treatment.

Osteosarcoma Surveillance Study

A 10-year safety surveillance study was initiated in order to monitor for a trend signaling a possible association between teriparatide, an injectable treatment for osteoporosis, and adult osteosarcoma.

Study Objectives

Primary

- To identify approximately 40% of all newly diagnosed cases of osteosarcoma in men and women aged 40 years and older in the US, for a duration of at least 10 years;
- To identify incident cases of adult osteosarcoma, if any, who have a history of treatment with the drug of interest.

Secondary

- To systematically collect, for descriptive epidemiology purposes, additional patient information, including demographics, other drug treatments, relevant exposures, and comorbid conditions in this large series of individuals with osteosarcoma.

Study Procedures

After obtaining registry approval, RTI-HS identifies patients through the selected state, regional, and medical center cancer registries; receives descriptive demographic and cancer information from the registry; obtains patient consent; and conducts telephone interviews with patient or proxy to ascertain drug treatments, relevant exposures, and comorbid conditions.

OBJECTIVE

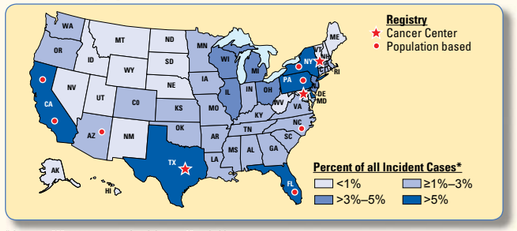
To characterize the demographic, environmental, and treatment exposure profiles of adult osteosarcoma patients from an ongoing surveillance study where patients in the US are identified through cancer registries, and relevant history and exposures are ascertained by telephone interview.

METHODS

Design

- Collect demographic, cancer descriptors, and environmental and treatment exposures in adult osteosarcoma patients;
- Conduct descriptive analyses to characterize the demographic profile, tumor cell morphology, and topography among all reported cases;
- Determine prevalence of potential risk factors among interviewed cases.

Figure 1. Geographic Distribution of Incident Osteosarcoma Cases and Location of Participating Surveillance Study Registries as of December 2006



* Assumes 290 cases per year in adults age 40 and older.

Setting

US Oncology Referral Centers (state/regional population-based cancer registries or comprehensive cancer center registries) with high numbers of cases of adult osteosarcoma in the US that were participating in the Osteosarcoma Safety Surveillance Study as of December 2006 (Figure 1):

- Seven state or regional central cancer registries (population-based);
- Three comprehensive cancer center registries.

Main Outcomes

The following were the main outcomes for this analysis:

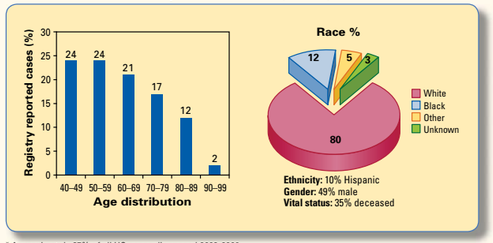
- Prevalence of potential risk factors and characteristics (lifestyle exposures; treatment, injury, and infection exposures; environmental exposures; personal and family history) (Table 1);
- Demographic profile (mean age and age range, gender, race, and ethnicity) (Figure 2);
- Tumor topography and morphology distribution (Figures 3 and 4);
- Matching of prior radiation treatment site and tumor site (Table 2).

RESULTS

Table 1. Self-Reported Prevalence of Characteristics Among Interviewed Patients, (N = 124)

Lifestyle Exposures	Treatment, Injury, and Infection Exposures
• 87 patients (70%) reported drinking alcoholic beverages during the 12 months prior to osteosarcoma diagnosis. • 68 patients (55%) reported smoking at least 100 cigarettes in their lifetime. • 20 patients (16%) reported smoking cigars 1 or more days a week for more than 1 month. • 13 patients (10%) reported smoking a pipe more than 1 day a week for more than 1 month.	• 29 patients (23%) reported previous other cancers. • **23 patients (19%) reported prior radiation treatment for cancer, thyroid disease, or other conditions.** • 21 patients (17%) reported an injury or infection in the same bone at the same place as the osteosarcoma. • 17 patients (14%) reported previously receiving chemotherapy. • 4 patients (3%) reported radioactive iodine treatment for thyroid disease.
Environmental Exposures	**Personal and Family History**
• 33 patients (27%) reported living close to or working with pesticides, or serving in Vietnam or Desert Storm. • 17 patients (14%) reported working with petrochemicals • 8 patients (6%) reported having lived within 10 miles of a nuclear power plant or nuclear waste facility.	• 30 patients (24%) reported a family history of breast cancer. • 12 patients (10%) reported a history of Paget's disease. • **9 patients (7%) reported a family history of osteosarcoma.** • **4 patients (3%) reported a family history of retinoblastoma.**

Figure 2. Demographic Characteristics of Adult Osteosarcoma Patients Reported to the Osteosarcoma Surveillance Study as of December 2006 (N = 430*)



* Approximately 37% of all US cases diagnosed 2003-2006.
Mean age: 61.7 years, range: 40–96 years.

Figure 3. Tumor Site Distribution of Adult Osteosarcoma Patients Reported as of December 2006

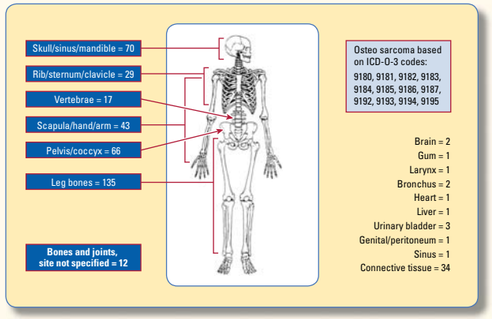


Figure 4. Tumor Morphology Distribution by Site of Tumor

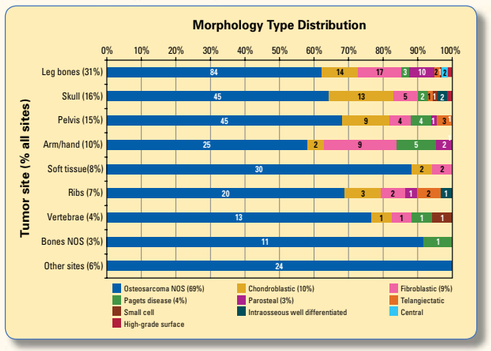


Table 2. Tumor Site Matched to 23 Reported Previous Radiation Sites, 19 Positive Matches (83%)*

Registry-Reported Tumor Site	No. of Cases	Before you were diagnosed with bone cancer, where did you receive the radiation (specify)?†
Skull/face/mandible	3	Other specify (head/neck)
Skull/face/mandible	4	Skull/face/mandible
Ribs/sternum/clavicle	2	Head/neck (NA)
Ribs/sternum/clavicle	1	Other specify (Throat)
Ribs/sternum/clavicle	2	Chest/breast (NA)
Scapula/hand/arm bones	1	Chest/breast (NA)
Scapula/hand/arm bones	1	Right arm/hand (NA)
Connective and soft tissue	1	Chest/breast (arm)
Connective and soft tissue	1	Other specify (melanoma groin)
Leg bones	1	Other specify (prostate)
Leg bones	1	Chest/breast (knee)
Vertebrae	1	Abdomen/pelvis (NA)

* Note: 83% match based upon additional information received since abstract submitted in February 2007.

† Question from telephone interview.

CONCLUSIONS

- Results from the first 3 years of data collection support and enhance the limited information from the literature in this patient population.
- Results are consistent with the reported link between radiation site and tumor site.
- This study offers a unique opportunity to examine morphology distribution by site for this rare cancer.

REFERENCE

1. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 9 Regs Public-Use, Nov 2004 Sub (1973-2002), National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch.

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