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Incidence of Melanoma in the Pediatric Population: A Population-Based Study in Olmsted County, Minnesota

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Abstract

Background/Objectives—The incidence of melanoma has been rising in the United States, with conflicting evidence regarding trends in the pediatric population.

Methods—We identified patients who were from 0 to 17 years old with a diagnosis of melanoma from January 1, 1970, through December 31, 2010, in Olmsted County, Minnesota. Survival and demographic information was abstracted, and estimates of true incidence were calculated.

Results—The estimated true incidence of melanoma in the pediatric population from 1970–2010 was found to be 0.62 per 100,000 and 0.45 per 100,000 in females and males, respectively. The incidence of melanoma in this population did not increase with time after adjusting for age and sex. Only one case of metastatic disease (lymph node) was identified. Females were more commonly affected and the mean age of disease onset was 14 years. Five of the 7 melanomas in this population of interest arose in association with a nevus, and none involved the trunk. Overall and disease-specific survival rates were not calculated because all patients studied were alive at last follow-up.

Conclusion—The estimated true incidence rates of pediatric melanoma from our population-based study in Olmsted County, Minnesota, appear stable; this finding is in contrast to our prior research showing rapidly increasing incidence rates of melanoma in young and middle-aged adults from the same population.

Keywords

incidence; melanoma; pediatrics

Introduction

The incidence of malignant melanoma (MM) is rising quickly in the United States, and it is currently the fifth most common cancer in men and the sixth most common in women.¹ In children, MM is the most common cutaneous malignancy, representing 1% of all new cases reported.² The incidence of melanoma is increasing faster than any other neoplasm, with the exception of lung cancer in women.³ The overall estimated incidence of MM is increasing

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for adults^{4–7} and children.^{8–11} Moreover, recent epidemiologic data from the Surveillance, Epidemiology, and End Results (SEER) program show incidence rates of melanoma increasing at 2% per year in the pediatric population.¹¹ However, reporting of melanoma to large national registries is fraught with problems of underreporting and delayed reporting.^{12,13} Here, we sought to estimate the true incidence of MM in the pediatric population of Olmsted County, Minnesota, using a high-quality data set in a well-defined patient population.¹⁴

Patients and Methods

Olmsted County, Minnesota, is an ideal setting for population-based studies. The area is relatively isolated from major urban centers, and the majority of medical care is provided by a limited number of providers. Mayo Clinic has used an extensive indexing system since inception of the clinic to track diagnoses among its patients. The Rochester Epidemiology Project (REP) was started in 1966 when similar indices of diagnoses for the other medical providers in the county were created. The result is linkage of medical data from almost all sources of medical care available to the local population of Olmsted County (Mayo Clinic and Olmsted Medical Center). This data resource provides the ability to conduct population-based analytic studies for almost any disease. In the last half century of the project, more than 1,000 such studies have been performed.¹⁴

All cases of cutaneous MM were identified through the REP databases using appropriate codes from the International Classification of Diseases, Ninth Revision. Once identified, the complete medical record of each patient was reviewed to confirm the diagnosis of cutaneous melanoma and to confirm residency status in Olmsted County, Minnesota. For all confirmed cases, the date of diagnosis was established based on the date of biopsy. Only patients with a confirmed diagnosis of cutaneous melanoma, age from 0 through 17 years, Olmsted County residency, and date of diagnosis from January 1, 1970, through December 31, 2010, were included in the study. The incidence rates of melanoma were calculated assuming the entire male and female population of Olmsted County aged 0 through 17 years were at risk. The denominator was estimated by linear interpolation of the decennial census. Both overall and sex-specific incidence rates were reported. Incidence rates were estimated per decade (1971–1980, 1981–1990, 1991–2000, and 2001–2010) to identify any change in incidence over time.

Results

In the past 4 decades (1970–2010), 7 incidence cases of cutaneous MM were identified in Olmsted County, Minnesota, resulting in an incidence rate of 0.53 per 100,000 person-years after adjusting for the age and sex distribution of the US white population in 2000. Patient characteristics are shown in the Table. The estimated true incidence of MM in males and females was 0.62 and 0.45 per 100,000 person-years, respectively. Incidence did not appear to increase with time. Only 1 case of metastatic disease (lymph nodes) was identified. Four of the 7 cases occurred in females. Mean age of disease onset was 14 years. Five of the 7 cases of MM arose in association with a nevus, and none involved the trunk. Overall and

disease-specific survival rates were not calculated because all patients were alive at last follow-up.

Discussion

The estimated true incidence of MM in Olmsted County appears to be increasing rapidly in younger and middle-aged adults (age 18–39 and 40–60 years, respectively), especially among women.^{6,7} However, the incidence of MM in children from the same study population appears stable. This supports the leveling off and decreasing trend in incidence rates for pediatric melanoma in Sweden¹⁵ and opposes recently published data from the SEER database in the United States.^{8,11}

As a referral center for melanoma, Mayo Clinic evaluates and treats pediatric melanoma patients from around the country. True incidence cases, however, are rare, as evidenced by our 7 cases over a 40-year period. We recognize that the number of patients in this study is small, but it is unlikely that incident cases were missed because final diagnoses from pathologic specimens are abstracted into the REP record. The calculated incidence rates of this study are consistent with published epidemiologic data for childhood and adolescent melanoma.^{9,10,15,16} Given that all of our pediatric melanoma patients were alive at last follow-up, our study supports a more favorable prognosis in children.^{17–19}

We acknowledge several limitations in the study. First, this is a retrospective study design that relied on complete and accurate documentation in the medical record. It is reasonable to assume, however, that inaccurate documentation should be independent of the year studied and that trends in incidence over time will not be affected. In addition, only a limited number of patients were identified, making further statistical analyses and inferences challenging. Second, with such a low incidence rate, this study is underpowered to statistically detect an increase in rate of MM in this patient population. Finally, the data are based on the diagnosis of record; it is possible that a new histopathologic review (with masking of patient age) could change incidence rates. Moreover, the incidence may actually be underreported because some pathologists may be reluctant to diagnose MM in young children or adolescents.

In conclusion, the estimated true incidence of pediatric melanoma appears stable in this population-based study of Olmsted County, Minnesota, residents, unlike the rapidly increasing incidence rates in young and middle-aged adults in the same population.

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Abbreviations

MM	malignant melanoma
REP	Rochester Epidemiology Project

SEER Surveillance, Epidemiology, and End Results

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Table

Patient and Tumor Characteristics

Patient	Year of Diagnosis	Age at Diagnosis, y	Sex	Anatomic Location	Breslow Thickness, mm	Subtype of Melanoma	Association With Nevus	Metastasis	Date of Last Follow-up
1	1981	13	M	Wrist/hand	In situ	Superficial spreading	Yes	No	2011
2	1985	12	M	Thigh	In situ	Superficial spreading	Yes	No	2013
3	1988	14	F	Arm	0.5	Superficial spreading	Yes	No	2013
4	1988	15	F	Foot	In situ	Unknown	No	No	2006
5	2005	16	F	Forearm	1.3	Superficial spreading	Yes	No	2012
6	2009	17	F	Arm	0.18	Superficial spreading	Yes	No	2012
7	2010	14	M	Ear	>1	Unknown	No	Yes (lymph nodes)	2013