



# Primary Melanoma of the External Ear: A Population-Based Study of 5,481 Cases

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## ABSTRACT

**Objective:** Primary melanoma of the external ear (PMEE) is rare and therefore well-suited for large population-based registry analysis. The objective of this study was to utilize the Surveillance, Epidemiology, and End Results (SEER) set of cancer registries to determine the incidence, treatment, and survival characteristics of PMEE.

**Study Design:** Retrospective cohort analysis of SEER data, 2004-2013.

**Methods:** All cases of PMEE stage I-IV by AJCC 7th edition guidelines were extracted. Population-based incidence was calculated. Cancer-specific survival data by stage was assessed using Kaplan-Meier analysis and the relative effects of tumor characteristics were analyzed with Cox regression models.

**Results:** A total of 5,481 patients were analyzed (mean age 66.7 years, 86.5% male, 93.6% non-Hispanic white). The incidence of PMEE was 1.91 per 100,000 persons-per-year. At diagnosis, 68.1% were stage I, 15.2% were stage II, 4.7% were stage III, 1.5% were stage IV, and 10.8% were unknown. The five-year overall and cancer-specific survival was 78.8% and 90.0%, and, according to AJCC stage, was 85.7% and 95.3% for stage I (n=2287), 64.6% and 81.1% for stage II (n=453), 50.8% and 57.0% for stage III (n=154), 17.2% and 20.5% for stage IV (n=34), and 71.0% and 87.1% for unknown stage (n=330), respectively. The multivariable Cox model identified tumor characteristics that were independently associated with survival.

**Conclusion:** This is the first study to characterize the epidemiology, presentation and outcome of PMEE using the SEER registries. Older age, increasing Breslow thickness, tumor stage, presence of ulceration, positive lymph nodes and distant metastasis each independently predicted time to cancer-specific death.

## Patient Demographics (N=5,481)

Characteristic	Number	%
<b>Age</b>		
Mean (SD)	66.7 (16.5)	--
Median	69	--
Q1, Q3	57.0, 79.0	--
Range	(4.0-101.0)	--
<b>Age Group</b>		
0-49	840	15.3%
50-59	766	14.0%
60-69	1152	21.0%
70-79	1380	25.2%
80+	1343	24.5%
<b>Gender</b>		
Male	4741	86.5%
Female	740	13.5%
<b>Race</b>		
Non-Hispanic white	5128	93.6%
Hispanic	147	2.7%
Non-Hispanic Black	9	0.2%
Non-Hispanic Asian or Pacific Islander	14	0.3%
Other or Unknown	183	3.3%

## BACKGROUND

- The incidence of cutaneous melanoma continues to rise in the United States with an estimated 76,380 new cases diagnosed in 2016.
- Approximately 25% of all cutaneous melanomas involve the head and neck region, and primary melanoma of the external ear (PMEE) accounts for 7–20% of all head and neck melanoma.
- Overall, PMEE accounts for 1-4% of all cutaneous melanomas.
- Since PMEE is an uncommon clinical entity, the current study utilizes a national population-based tumor registry to better define the incidence and survival characteristics of PMEE

## Tumor Characteristics for Patients with PMEE (N=5,481)

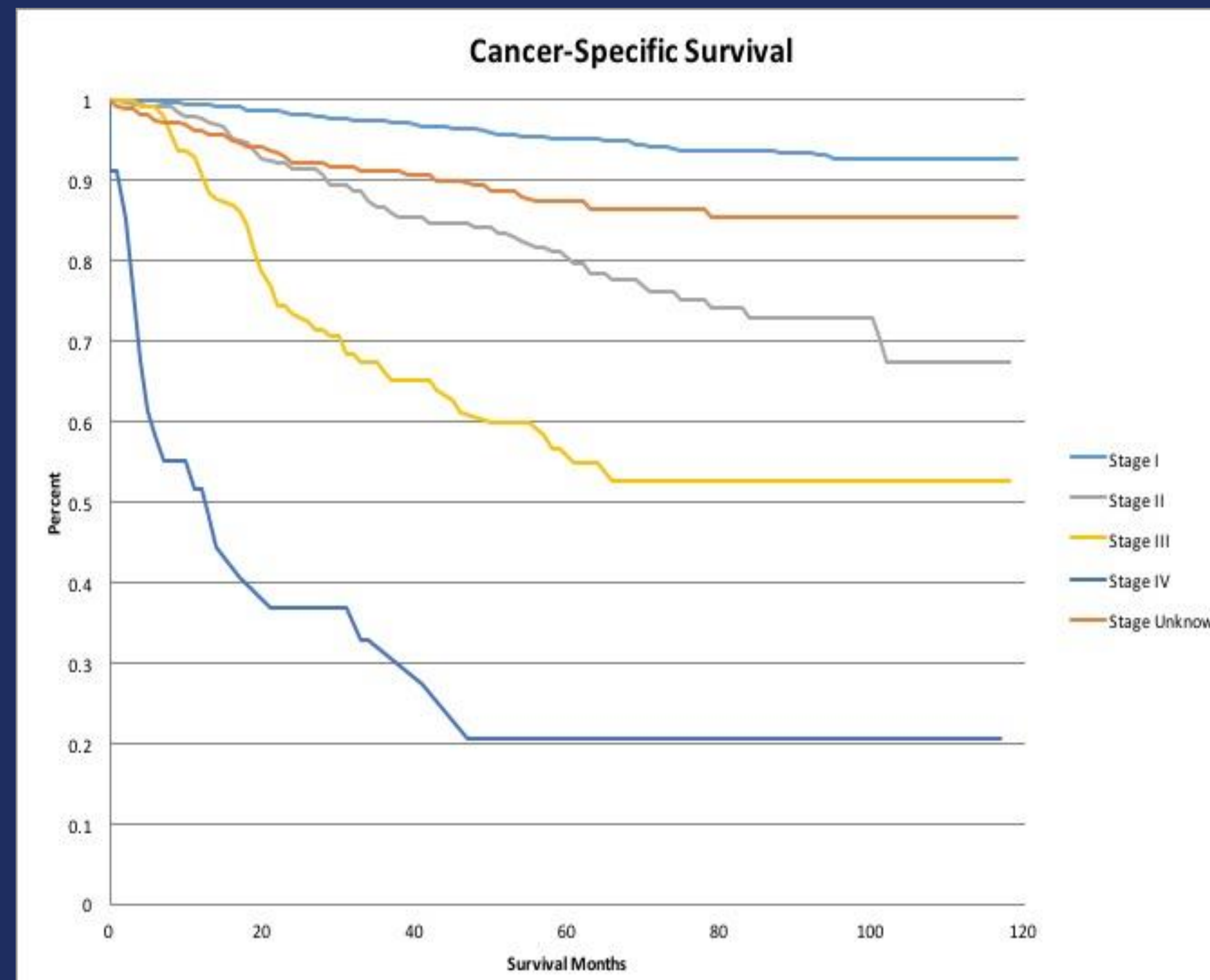
Characteristic	Number	%
<b>Tumor Size</b>		
<1 cm	946	17.3%
1-2 cm	655	12.0%
2-3 cm	175	3.2%
3+ cm	213	3.9%
Missing	3492	63.7%
<b>Stage Group</b>		
Stage I	3730	68.0%
Stage II	832	15.2%
Stage III	258	4.7%
Stage IV	80	1.5%
Stage Unknown	581	10.6%
<b>Histologic Subtype</b>		
Superficial spreading	1113	20.3%
Lentigo maligna	954	17.4%
Nodular	422	7.7%
Other/NOS	2992	54.6%
<b>Breslow Thickness</b>		
<1 mm	3242	59.1%
1-2 mm	914	16.7%
2-3 mm	404	7.4%
3-4 mm	167	3.0%
4-5 mm	115	2.1%
5+ mm	192	3.5%
Microinvasion-NOS	445	8.1%
<b>Clark Level</b>		
II	1631	29.8%
III	1016	18.5%
IV	1578	28.8%
V	230	4.2%
Unknown/NOS	1026	18.7%
<b>Lymph Node Status</b>		
Negative	4831	88.1%
Positive	232	4.2%
Unknown	418	7.6%
<b>Distant Metastasis</b>		
Negative	5184	94.6%
Positive	80	1.4%
Unknown	217	4.0%
<b>Ulceration</b>		
Absent	4358	79.5%
Present	785	14.3%
Unknown	338	6.2%

## Cancer Specific Death by Stage

Stage	N	Number of Deaths	Median Survival Time (months)	1 year	3 year	5 year
Overall	3258	251	40	98.0%	93.2%	90.0%
Stage I	2290 (70%)	82	43	99.5%	97.4%	95.3%
Stage II	454 (14%)	65	32	97.7%	86.8%	81.1%
Stage III	155 (5%)	50	26	90.8%	66.3%	56.6%
Stage IV	34 (1%)	23	7.5	51.7%	32.8%	20.5%
Stage Unknown	325 (10%)	31	39	96.1%	91.1%	87.4%

## Multivariable Cox Model of Cancer Specific Survival in PMEE Patients

Variable	HR (95% CI)	P-value
<b>AGE</b>		
Age group 50-59 vs 0-49	1.57 (1.01—2.45)	0.046
Age group 60-69 vs 0-49	1.82 (1.17—2.84)	0.006
Age group 70-79 vs 0-49	2.29 (1.50—3.51)	0.001
Age group 80+ vs 0-49	3.29 (2.17—4.98)	<0.001
<b>SEX</b>		
Female vs. Male	1.00 (0.71—1.42)	0.992
<b>HISTOLOGIC SUBTYPE</b>		
Lentigo vs Superficial Spreading	0.62 (0.37—1.05)	0.741
Nodular vs Superficial Spreading	1.12 (0.73—1.73)	0.606
Unknown vs Superficial Spreading	0.77 (0.55—1.07)	0.116
<b>BRESLOW</b>		
Breslow 1-2 cm vs <1 cm	2.00 (1.370—2.91)	<0.001
Breslow 2-3 cm vs <1 cm	2.78 (1.76—4.41)	<0.001
Breslow 3-4 cm vs <1 cm	3.16 (1.83—5.47)	<0.001
Breslow 4-5 cm vs <1 cm	3.24 (1.73—6.05)	<0.001
Breslow 5+ cm vs <1 cm	5.21 (3.10—8.74)	<0.001
<b>ULCERATION</b>		
Ulceration Present vs No Ulceration	2.04 (1.50—2.79)	<0.001
Ulceration Unknown vs No Ulceration	0.92 (0.50—1.72)	0.804
<b>LYMPH NODE STATUS</b>		
LN Positive vs LN Negative	3.84 (2.70—5.46)	<0.001
LN Unknown vs LN Negative	1.76 (0.99—3.12)	0.051
<b>DISTANT METASTASIS</b>		
Distant Mets Unknown vs Negative	1.02 (0.51—2.05)	0.955
Positive Distant Mets vs Negative	9.80 (5.99—16.06)	<0.001
<b>STAGE</b>		
Stage II vs Stage I	3.71 (2.63—5.23)	<0.001
Stage III vs Stage I	11.66 (8.04—16.91)	<0.001
Stage IV vs Stage I	48.9 (30.34—79.08)	<0.001
Stage Unknown vs Stage I	2.62 (1.73—3.98)	<0.001



## CLINICAL PRESENTATION

- PMEE presents most commonly in non-Hispanic Caucasian men around the seventh decade of life.
- The incidence of cutaneous melanoma overall and PMEE specifically has risen over the past decade.
- The most common histologic subtypes observed are superficial spreading, followed by lentigo maligna, and nodular melanoma.
- At presentation, about 75% of patients present with stage I disease and have a tumor thickness of less than 2 mm.

## MANAGEMENT

- Wide local excision with 1-2cm margins is recommended.
- Sentinel lymph node biopsy is performed to identify "at risk" nodal basins and guide further management such as parotidectomy and neck dissection, due to the unpredictable lymphatic drainage pattern of the ear.

## PROGNOSTIC FACTORS

- Tumor thickness, overall stage, regional lymph nodes status, and distant metastasis are independent predictors of cancer-specific death.
- Regional or distant metastasis (stage III or IV) demonstrated the greatest risk of mortality at 5 years.
- Of the tumor-specific factors, increasing Breslow thickness (particularly >2 mm) was found to be the strongest predictor of cancer-specific death.
- Ulceration was present in 14.3% of tumors and this increased cancer-specific mortality by two-fold.
- Sex and histologic subtype did not appear to affect time to cancer-specific death.

## SURVIVAL OUTCOMES

- Historically, PMEE was thought to portend a worse prognosis compared to melanomas originating at other head and neck subsites and, as a result, more aggressive surgical approaches were recommended.
- In this study of patients with PMEE treated between 2004 and 2013, we found a 90% five-year cancer-specific survival for all stages combined.
- A trend toward increasing survival for PMEE compared to historical series was observed, which may reflect increased utilization of PET scans, skin self-examinations, and a greater awareness of the disease by the medical community leading to the diagnosis of earlier stage, thinner melanomas as compared to the past.
- Unfortunately, prognosis for patients with stage III or IV disease continues to be unsatisfactory, given the 5-year disease-specific survival rates of 56.6% and 20.5%, respectively.

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