Chapter 12
Melanoma

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INTRODUCTION

In general, it is considered that mortality from melanoma is in most cases preventable, because the disease is characterized by an easily recognizable lesion (unusual moles or nevi), and early intervention appears to guarantee an excellent prognosis with limited recurrence (1). While the incidence of melanoma has been rising in most countries and populations worldwide since the 1960s (2), there is some evidence that at least part of this increase can be attributed to wider reaching screening programs that attempt to capitalize on the benefit of early detection (3). Were this true we would expect to see improvements in survival through time; indeed, this has been observed in the white populations of Sweden (4, 5) and Switzerland (6), particularly among females, who overall have better chances of survival from melanoma than males (6), but among whom one might first expect to see improvements in survival due to self-screening and general health awareness.

The documentation of improved melanoma survival over time has been limited to these two populations, whose rates of melanoma are not very high by world standards – the highest rates in the world are found in Australia, New Zealand, and in the Southwest of the United States, particularly Los Angeles (7). Among these populations, whose high rates of melanoma are attributed to excessive childhood sun exposure, little is known about the factors related to survival. In the Swedish and Swiss populations, females have uniformly better survival rates than males, survival is substantially better with thinner lesions (which presumably represent tumors diagnosed at an earlier stage of development, and therefore are more amenable to intervention), but no differences are observed in survival among the major histologic types of melanoma. The majority of melanomas can be regarded as having either an invasive, infiltrating histologic type (nodular melanomas, NM) or a less invasive, thinner form which is more likely to spread radially across the skin's surface rather than vertically into the dermis (superficial spreading melanoma, SSM). Given the relationship between lesion thickness and melanoma prognosis, SSM ought to have better survival than NM. While there is conflicting evidence on whether or not these two main types of lesion are biologically distinct (8), data from Sweden indicate an increase in the incidence of SSM that might signify a role of earlier detection in the overall increase in melanoma incidence in most developed countries worldwide (5, 9). A third form of melanoma, Hutchinson's melanotic freckle, represents a distinct histologic entity whose prognosis is unclear, because in most data sets they are too rare to draw firm conclusions.

Finally, there are substantial differences in the incidence of melanomas at differing anatomical locations of the body, which in part support (and in fact were responsible for the development of) the hypothesis that sunlight ex-

Table 12.1: Melanoma: Number of Cases and Exclusions by Reason, 12 SEER Areas, 1988-2001

Number Selected/Remaining	Number Excluded	Reason for Exclusion/selection
103,334	0	Select 1988-2001 diagnosis (Los Angeles for 1992-2001 only)
85,854	17,480	Select first primary only
85,733	121	Exclude death certificate only or at autopsy
81,246	4,487	Exclude unknown race
80,633	613	Exclude alive with no survival time
79,954	679	Exclude children (Ages 0-19)
55,173	24,781	Exclude in situ cancers for all except breast & bladder cancer
55,039	134	Exclude no or unknown microscopic confirmation

Table 12.2: Melanoma: Number and Distribution of Cases and 1-, 2-, 3-, 5-, 8-, & 10-Year Relative Survival Rates (%) by Race and Sex, Ages 20+, 12 SEER Areas, 1988-2001

Race/Sex	Cases	Percent	Relative Survival Rate (%)					
			1-Year	2-Year	3-Year	5-Year	8-Year	10-Year
White	54,197	100.0	97.2	94.6	92.6	90.2	88.4	88.1
Male	29,785	55.0	96.6	93.5	91.0	88.4	86.5	86.3
Female	24,412	45.0	97.8	95.9	94.4	92.4	90.4	90.0
Black	305	100.0	88.6	82.9	79.7	73.4	70.3	70.3
Male	155	50.8	85.2	78.4	75.0	70.1	69.6	69.6
Female	150	49.2	92.1	87.4	84.4	76.3	69.8	69.8

posure plays a role in melanoma – in males, melanomas are more common on the trunk and ears or head than in females, who have melanomas more frequently on their lower legs and their arms (10). These findings coincide roughly with the differences in sun protection afforded males and females by virtue of their clothing choices and hairstyles. Whether or not these site-specific differences are reflected in differing survival is of interest given the increased likelihood that lesions will be recognized earlier on sun-exposed skin surfaces. Swiss data show that survival is greater at every anatomic location for females than males, but that observation is based on very few data points (6).

MATERIALS AND METHODS

Case selection

Cases were selected from those reported to the NCI SEER Program with a diagnosis occurring between 1988 and 2001 (except for those cases obtained from the Los Angeles Cancer Surveillance Program which included the years 1992-2001 only). Cases were followed for vital status until 2003. Further descriptions of the NCI SEER Program, data selection and relative survival analysis can be found in Chapter 1: "Materials and Methods". We used the first primary diagnosis of melanoma only, and excluded those cases whose report was obtained solely from a death certificate or from report at autopsy, or those with no microscopic confirmation of diagnosis. In order to complete race-specific analyses, we excluded those with an unknown race, and in order to obtain complete data on survival time, we excluded those cases for whom active follow-up continued, but for whom there was no available survival time (that is, follow-up date was the same as diagnosis date, and no further follow-up data had been obtained). All cases under the age of 20 years were excluded both because melanoma is extremely rare in this age group, and because separate monographs have been published for childhood and adolescent/young adult cancers.

We conducted age- and sex-specific analyses, using 10-year age groups to ensure sufficient sample sizes in each age/sex group, as previous reports indicated a more favorable survival among both the young, and among females (11). Despite the comparative rarity of melanoma among blacks, we had sufficient data to consider sex-specific survival rates among both blacks and whites (but not age-specific rates for blacks). In all subsequent analyses (anatomic site, tumor thickness and histology, as detailed below) we

Table 12.3: Melanoma (Among Whites): Age Distribution (20+) by Sex, 12 SEER Areas, 1988-2001

Sex	Male		Female	
Age Group (Years)	Cases	Percent	Cases	Percent
Total	29,785	100.0	24,412	100.0
20-29	1,179	4.0	2,079	8.5
30-39	3,445	11.6	4,570	18.7
40-49	5,766	19.4	5,251	21.5
50-59	6,067	20.4	4,035	16.5
60-69	6,142	20.6	3,473	14.2
70-79	4,980	16.7	3,030	12.4
80+	2,206	7.4	1,974	8.1

Figure 12.1: Melanoma (Among Whites): Relative Survival Rates (%) for Males by Age (20+), 12 SEER Areas, 1988-2001

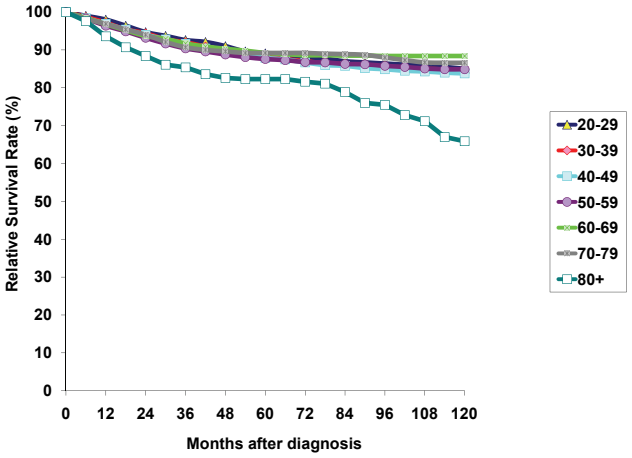
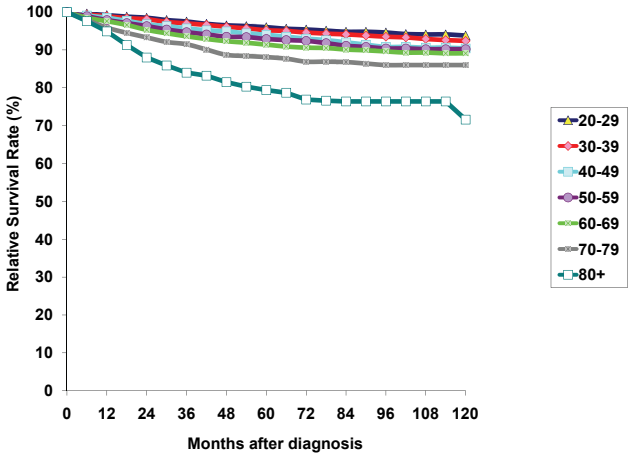


Figure 12.2: Melanoma (Among Whites): Relative Survival Rates (%) for Females by Age (20+), 12 SEER Areas, 1988-2001



focus on whites only, as data for blacks were too sparse. In all these subsequent analyses we separate analyses for males and females.

Anatomic site classification

Few data sources provide the opportunity to investigate melanoma survival by anatomic site of the lesion, yet there is substantial evidence that risk of developing melanoma is related to anatomic site, and it is fair to assume that, because melanoma can be prevented by the early recognition of lesions, those occurring on more exposed body sites would have the most favorable prognosis and a higher rate of survival. We classified the site of melanomas according to ICDO-2 site coding: C44.0 (lip); C44.1 (eyelid); C44.2 (ear); C44.3 (face excluding eyelid); C44.4 (scalp and neck excluding ear); C44.5 (trunk); C44.6 (upper limb and shoulder); C44.7 (lower limb and hip); C44.8 (overlapping site); C44.9 (site not specified).

Tumor thickness classification

Likewise, one of the strongest predictors of melanoma prognosis from case series and the few survival studies with sufficient data to investigate the same is the thickness of the tumor at diagnosis, with tumors of the greatest depth having the worst prognosis and survival. Thickness of melanomas is recorded as the depth in millimeters of the lesion, and we categorized the thicknesses in the same groups as found in Levi et al (1998), for comparative purposes – these thickness groupings (<0.75mm, 0.75-1.49mm, 1.50-2.49mm, 2.50-3.99mm, >3.99mm and unknown) also represent the levels most commonly used to describe the changing incidence of melanoma, as they are considered representative of the severity of disease: those <0.75mm rarely recur after removal, those 0.75-1.49mm have a greater chance of recurrence but a small chance of mortality, and those >3.99mm have an almost universal prognosis of multiple recurrence and short survival time in clinical series.

Histologic type classification

We categorized melanomas on the basis of ICDO-2 histology code: superficial spreading melanoma (SMM): 8743; nodular melanoma (NM): 8721; acral lentiginous melanoma (ALM): 8744; Hutchinson's melanotic freckle (HMF): 8742. The remainder of histologic types comprised those recorded simply as 'malignant melanoma' (MM): 8720, and those recorded as 'other or not specified' (8722-8741, 8745-8790).

RESULTS

Case selection

Between 1988 and 2001, 103,334 melanomas cases were diagnosed and reported to SEER. We removed from analysis 17,480 cases which were not first primaries, a further 5,355 cases because they were obtained from death certificate only, had no microscopic confirmation of diagnosis, had an unknown race, or no follow-up data (see Table 12.1 for details); 679 cases aged between 0 and 19 years; and finally, 24,781 cases reported as in situ cancers. There were 55,039 adult cases remaining for analysis.

Table 12.4: Melanoma (Among Whites): Number and Distribution of Cases and 1-, 2-, 3-, 5-, 8-, & 10-Year Relative Survival Rates (%) by Sex and Anatomic Site, Ages 20+, 12 SEER Areas, 1988-2001

Sex/Anatomic Site	Cases	Percent	Relative Survival Rate (%)					
			1-Year	2-Year	3-Year	5-Year	8-Year	10-Year
Male	29,785	100.0	96.6	93.5	91.0	88.4	86.5	86.3
Lip	56	0.2	91.3	85.0	81.7	71.9	69.1	69.1
Eyelid	81	0.3	100.0	99.2	99.2	91.1	82.2	81.5
Ear	1,336	4.5	99.0	96.8	95.3	94.5	91.2	90.8
Face	2,825	9.5	99.3	96.3	93.5	90.4	89.4	89.4
Scalp & Neck	2,347	7.9	97.4	92.0	86.9	82.2	77.4	76.2
Trunk	12,340	41.4	98.4	96.0	93.8	91.4	89.4	88.9
Upper Limb/Shoulder	6,378	21.4	99.2	97.0	95.5	93.5	93.5	93.5
Lower Limb/Hip	2,852	9.6	98.8	95.9	93.1	89.7	86.5	85.6
Overlapping	41	0.1	98.7	94.9	90.8	90.2	77.2	70.4
NOS	1,529	5.1	59.3	48.0	43.6	39.8	37.3	36.2
Female	24,412	100.0	97.8	95.9	94.4	92.4	90.4	90.0
Lip	37	0.2	96.4	87.2	81.8	81.8	81.8	81.8
Eyelid	79	0.3	100.0	95.2	93.3	89.5	84.4	78.5
Ear	185	0.8	99.0	98.5	97.6	93.5	83.3	80.8
Face	1,916	7.8	99.1	97.2	95.6	93.6	90.8	90.8
Scalp & Neck	918	3.8	98.0	93.5	89.8	83.4	79.5	78.6
Trunk	6,240	25.6	98.4	96.8	95.2	93.0	90.6	90.3
Upper Limb/Shoulder	6,266	25.7	99.1	98.0	96.8	95.6	94.4	93.3
Lower Limb/Hip	7,930	32.5	99.2	97.5	96.4	94.8	93.1	92.5
Overlapping	20	0.1	~	~	~	~	~	~
NOS	821	3.4	65.9	55.8	51.9	46.6	45.2	44.1

~ Statistic not displayed due to less than 25 cases.

Table 12.5: Melanoma (Among Whites): Number and Distribution of Cases and 1-, 2-, 3-, 5-, 8-, & 10-Year Relative Survival Rates (%) by Sex and Tumor Thickness, Ages 20+, SEER 1988-2001

Sex/Tumor Thickness	Cases	Percent	Relative Survival Rate (%)					
			1-Year	2-Year	3-Year	5-Year	8-Year	10-Year
Male	29,785	100.0	96.6	93.5	91.0	88.4	86.5	86.3
< 0.75 mm	12,948	43.5	100.0	100.0	100.0	100.0	100.0	100.0
0.75 - 1.49 mm	5,545	18.6	100.0	98.7	97.2	94.8	92.6	92.0
1.50 - 2.49 mm	2,729	9.2	99.0	95.0	89.5	81.6	75.4	74.4
2.50 - 3.99 mm	1,558	5.2	96.4	87.5	79.2	67.4	58.9	58.2
4.00+ mm	1,633	5.5	90.0	73.9	62.8	54.0	46.9	45.9
Unknown	5,372	18.0	84.8	78.3	75.0	71.8	69.2	68.2
Female	24,412	100.0	97.8	95.9	94.4	92.4	90.4	90.0
< 0.75 mm	12,201	50.0	100.0	100.0	100.0	99.7	99.2	99.2
0.75 - 1.49 mm	4,458	18.3	99.9	99.0	97.8	95.6	93.3	92.0
1.50 - 2.49 mm	1,867	7.6	98.3	94.5	91.0	86.0	80.0	77.8
2.50 - 3.99 mm	1,002	4.1	97.1	90.3	83.6	75.8	70.1	68.0
4.00+ mm	965	4.0	93.1	79.9	70.5	61.3	51.2	49.9
Unknown	3,919	16.1	89.2	84.7	82.7	79.7	77.8	77.2

Figure 12.3: Melanoma (Among Whites): Relative Survival Rates (%) For Males by Tumor Thickness, Ages 20+, 12 SEER Areas, 1988-2001

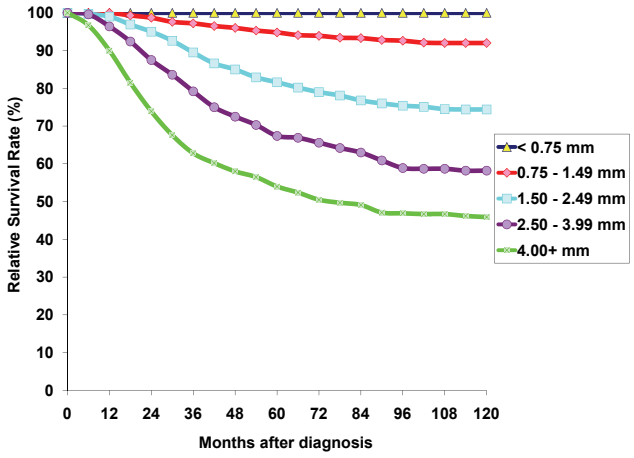
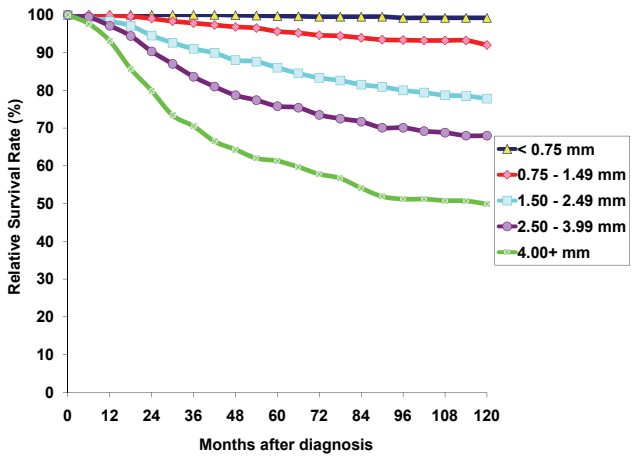


Figure 12.4: Melanoma (Among Whites): Relative Survival Rates (%) for Females by Tumor Thickness, Ages 20+, 12 SEER Areas, 1988-2001



Age, sex and race

Even though melanoma is rare among the black population, it is clear that black patients have a far poorer prognosis of melanoma than white patients (Table 12.2). This was true both overall, and separately for males and females. While white females experienced increasingly better survival rates than white males from 12 months all the way to 10 years beyond diagnosis, the same was not true for black females – black females experienced substantially better survival than black males up to 5 years, but 8- and 10-year survival rates were similar in black males and females.

Age-specific data were too sparse among blacks for meaningful analysis, but among whites (Table 12.3), the age distribution was younger for females (Table 12.3) and the relative survival rates were substantially worse among the older (particularly among those aged 80 years and over) than the younger (Figures 12.1 and 12.2). Older men had the poorest survival. For the younger age groups, there appeared to be more of a survival differential for females by age than males (Figures 12.1 (males) and 12.2 (females)).

Table 12.6: Melanoma (Among Whites): Number and Distribution of Cases and 1-, 2-, 3-, 5-, 8-, & 10-Year Relative Survival Rates (%) by Sex and Histology, Ages 20+, 12 SEER Areas, 1988-2001

Sex/Histology (ICD-O code)	Cases	Percent	Relative Survival Rate (%)					
			1-Year	2-Year	3-Year	5-Year	8-Year	10-Year
Male	29,785	100.0	96.6	93.5	91.0	88.4	86.5	86.3
Superficial Spreading (8743)	11,510	38.6	100.0	99.0	98.0	96.6	95.3	95.2
Nodular (8721)	2,671	9.0	93.7	84.4	77.0	68.4	63.0	61.6
Acral Lentiginous (8744)	242	0.8	98.8	91.9	87.8	75.7	67.9	61.5
Other and Not Specified	1,185	4.0	94.9	88.7	83.7	80.5	79.5	78.2
Malignant Melanoma, NOS (8720)	12,019	40.4	93.2	89.2	86.2	83.4	81.1	80.8
Hutchinson's Melanotic Freckle (8742)	2,158	7.2	100.0	100.0	100.0	100.0	100.0	100.0
Female	24,412	100.0	97.8	95.9	94.4	92.4	90.4	90.0
Superficial Spreading (8743)	10,780	44.2	100.0	99.7	99.0	98.0	96.8	96.6
Nodular (8721)	1,739	7.1	95.2	87.6	82.0	74.6	68.8	67.4
Acral Lentiginous (8744)	302	1.2	99.4	96.1	93.5	89.1	79.1	79.1
Other and Not Specified	794	3.3	94.5	90.2	84.9	83.3	81.4	77.7
Malignant Melanoma, NOS (8720)	9,591	39.3	95.5	92.8	91.3	88.9	86.9	85.9
Hutchinson's Melanotic Freckle (8742)	1,206	4.9	100.0	100.0	100.0	99.4	96.1	95.5

Figure 12.5: Melanoma (Among Whites): Relative Survival Rates (%) for Males by Histology, Ages 20+, 12 SEER Areas, 1988-2001

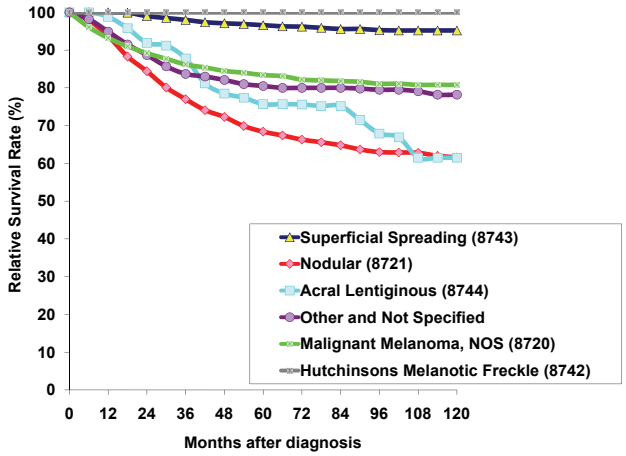
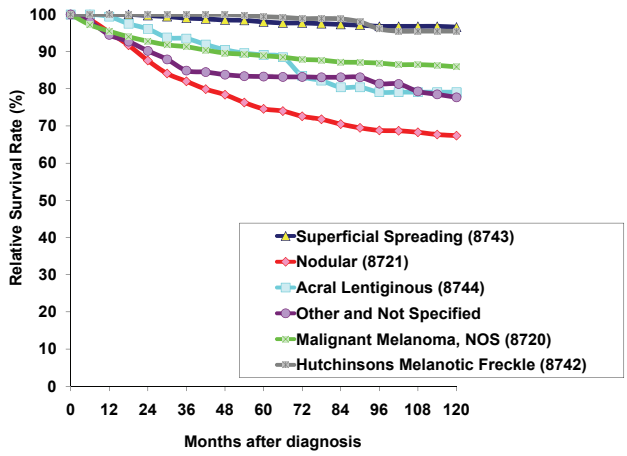


Figure 12.6: Melanoma (Among Whites): Relative Survival Rates (%) for Females by Histology, Ages 20+, 12 SEER Areas, 1988-2001



Anatomic site

While the majority of melanomas occurred on the trunk and upper limbs, there were sufficient cases at all recorded anatomic sites to determine that the site-specific distribution and survival of melanoma differs substantially between males and females (Table 12.4). For males over 40% of the melanomas were on the trunk contrasted to 26% for females. For females, 32% were on the lower limb/hip contrasted to less than 10% for males. Overall the worst site-specific survival rate occurred for melanomas with an unspecified site, and among those of the scalp and neck. Melanomas occurring on the limbs and at overlapping sites had relatively better survival. Notable sex-specific differences in relative survival rates were seen for melanomas occurring on the ear, where males experienced better survival to 10 years than females, and the lower limbs, where females experienced better survival than males (relative to other sites).

Thickness of tumor

While a large proportion (18.0% for males and 16.1% for females) of cases had no reported thickness data (Table 12.5), survival clearly worsened with increasing tumor thickness (Figure 12.3 and Figure 12.4). Thin lesions (less than 0.75 mm) experienced almost negligible mortality even at ten years, but thick lesions (4 mm and over) had a relative survival rate 46% for males and 50% for females by 10 years, and there was a clear 'dose-response' relation between thickness and survival, making lesion thickness easily the most predictive aspect of melanoma survival. This was true for both males and females, although males experienced worse survival for each thickness level. Survival for people with tumors of an unknown thickness paralleled survival experienced by the median lesion thickness (data not shown), indicating that the group with an unknown thickness did not differ substantially from the group with reported lesion thickness.

Histologic type

For both males and females, the majority of tumors were evenly divided between superficial spreading melanomas (SSM) and malignant melanomas with no further specified histology (MM), with small percentages of the other histologic types (Table 12.6). Survival rates for SSM were only slightly better in females than in males, whereas nodular (NM) tumors had a worse prognosis in males (Figures 12.5 and 12.6). Ten year relative survival rates under 65% were seen for males with NM or acral lentiginous melanomas. Ten year rates more than 95% were seen for superficial spreading and Hutchinson's melanotic freckle (Figures 12.5 and 12.6).

Geographic location

Substantial differences appeared to exist between sex-specific survival rates across registries in the SEER program (Table 12.7). Hawaii experienced the highest overall survival for both males and females, and also appeared to have one of the smallest differences in survival between the sexes of any registry (Table 12.7). While relative survival rates were lower 5 years after diagnosis in Rural Georgia, this observation was based on very small numbers. Iowa had lower melanoma survival rates for males than most of the other registries, and the largest difference in survival rates between males and females.

Table 12.7: Melanoma (Among Whites): Number and Distribution of Cases and 1-, 2-, 3-, 5-, 8-, & 10-Year Relative Survival Rates (%) by SEER Geographic Area and Sex (Ages 20+), 12 SEER Areas, 1988-2001

Sex/SEER Geographic Area	Cases	Percent	Relative Survival Rate (%)					
			1-Year	2-Year	3-Year	5-Year	8-Year	10-Year
Total	54,197	100.0	97.2	94.6	92.6	90.2	88.4	88.1
Atlanta and Rural Georgia	4,394	8.1	97.8	96.2	94.6	92.6	91.0	90.3
Atlanta (Metropolitan) - 1988+	4,282	7.9	97.9	96.2	94.7	92.8	91.3	90.6
Rural Georgia - 1988+	112	0.2	95.9	93.9	89.3	84.0	79.4	76.5
California								
Los Angeles - 1992+	7,496	13.8	96.5	93.0	90.5	87.6	84.9	84.0
Greater Bay Area	9,483	17.5	97.5	94.9	92.7	90.2	87.5	86.6
San Francisco-Oakland SMSA - 1988+	6,147	11.3	97.6	95.1	92.9	90.3	88.2	87.5
San Jose-Monterey - 1988+	3,336	6.2	97.3	94.6	92.4	90.0	86.1	85.0
Connecticut - 1988+	7,263	13.4	97.6	94.8	92.6	90.4	89.6	89.6
Detroit (Metropolitan) - 1988+	5,644	10.4	97.3	95.0	93.1	91.0	89.2	88.8
Hawaii - 1988+	1,381	2.5	98.2	96.2	95.2	94.8	94.5	94.5
Iowa - 1988+	4,871	9.0	95.7	92.2	89.7	87.0	83.5	83.3
New Mexico - 1988+	2,599	4.8	96.4	93.4	92.0	89.1	88.4	86.3
Seattle (Puget Sound) - 1988+	7,755	14.3	97.9	96.1	94.3	92.4	90.9	90.7
Utah - 1988+	3,311	6.1	96.3	94.0	92.0	89.3	87.3	86.4
Male	29,785	100.0	96.6	93.5	91.0	88.4	86.5	86.3
Atlanta and Rural Georgia	2,407	8.1	97.3	95.0	93.2	90.1	88.1	87.8
Atlanta (Metropolitan) - 1988+	2,351	7.9	97.3	95.1	93.2	90.3	88.1	87.9
Rural Georgia - 1988+	56	0.2	98.6	93.0	91.6	82.5	82.2	75.7
California								
Los Angeles - 1992+	4,252	14.3	96.4	92.2	89.1	86.0	83.2	81.9
Greater Bay Area	5,345	17.9	96.9	93.7	90.9	87.6	85.7	84.6
San Francisco-Oakland SMSA - 1988+	3,473	11.7	96.9	93.9	91.3	87.8	85.9	84.8
San Jose-Monterey - 1988+	1,872	6.3	97.0	93.4	90.0	87.4	84.9	84.5
Connecticut - 1988+	3,984	13.4	97.4	94.3	91.6	89.9	89.4	89.4
Detroit (Metropolitan) - 1988+	3,138	10.5	96.9	94.2	92.1	89.5	87.5	87.4
Hawaii - 1988+	853	2.9	97.7	95.5	94.5	94.2	93.6	93.6
Iowa - 1988+	2,516	8.4	94.9	90.6	87.5	83.7	79.6	79.2
New Mexico - 1988+	1,456	4.9	95.6	91.2	89.7	86.5	86.0	84.6
Seattle (Puget Sound) - 1988+	4,035	13.5	97.0	94.9	92.5	90.7	88.3	87.5
Utah - 1988+	1,799	6.0	95.5	93.0	90.3	87.3	85.5	83.9
Female	24,412	100.0	97.8	95.9	94.4	92.4	90.4	90.0
Atlanta and Rural Georgia	1,987	8.1	98.4	97.5	96.2	95.5	93.9	92.9
Atlanta (Metropolitan) - 1988+	1,931	7.9	98.6	97.6	96.4	95.8	94.5	93.4
Rural Georgia - 1988+	56	0.2	93.1	93.1	85.6	84.5	74.2	74.2
California								
Los Angeles - 1992+	3,244	13.3	96.7	94.0	92.2	89.5	86.7	85.7
Greater Bay Area	4,138	17.0	98.2	96.5	95.1	93.4	89.6	88.9
San Francisco-Oakland SMSA - 1988+	2,674	11.0	98.4	96.7	95.0	93.5	90.9	90.7
San Jose-Monterey - 1988+	1,464	6.0	97.8	96.1	95.4	93.2	87.1	85.5
Connecticut - 1988+	3,279	13.4	97.9	95.4	93.8	90.9	89.6	89.6
Detroit (Metropolitan) - 1988+	2,506	10.3	97.8	96.0	94.4	92.7	91.2	90.2
Hawaii - 1988+	528	2.2	98.8	97.2	96.3	95.0	95.0	95.0
Iowa - 1988+	2,355	9.6	96.5	93.9	91.8	90.3	87.2	86.8
New Mexico - 1988+	1,143	4.7	97.3	95.9	94.7	92.1	89.9	87.9
Seattle (Puget Sound) - 1988+	3,720	15.2	98.9	97.4	96.2	94.1	93.4	93.3
Utah - 1988+	1,512	6.2	97.2	95.3	94.0	91.5	89.2	88.9

DISCUSSION

Clearly the factor most predictive of melanoma survival is thickness of the tumor at diagnosis, which reinforces the notion that there is much that can be achieved in preventing melanoma mortality, by early detection. However, we noted that the often observed survival differential that favors females over males also occurs within strata of tumor thickness. In addition, the melanomas among females were not as thick as those for males.

Melanoma among blacks, while rare, is a more lethal disease than it is among whites, and therefore deserves special attention and particularly more research into why blacks have lower survival rates. The only reports of melanoma survival among blacks come from case series (12) largely because melanoma among blacks is rare. We have identified sufficient cases of melanoma among blacks to be able to compare their survival to that of whites, and notice that blacks have far poorer melanoma survival than whites. This could be attributable to access to care, or could reflect the relative lack of knowledge of the risk of melanoma/skin cancer in black populations. Black populations may not be as carefully or regularly screened, and consequently may not benefit from improved survival due to early detection of lesions. One hint in future investigation of poor survival among blacks may come from the unusual observation that after 5 years there is no longer a survival difference between males and females, although the statistical significance of this finding needs to be established.

The only previous data presented on anatomical site-specific survival found as we have that survival varies with site in a manner similar to the incidence of melanoma (6). This observation is consistent with a 'visible skin' hypothesis (i.e. sun exposure is greater on visible skin areas, and visible skin is an easy place to detect lesions early), and argues again for a substantial role of early detection in improved survival. Overlapping lesions presumably have more favorable survival because they have spread outwards rather than downwards, and are therefore less invasive. We hypothesize that lesions of an unspecified anatomic site experience poor survival because they are discovered at an advanced stage when it is unclear where they started.

Similarly, the most vertically invasive histologic type (NM) has one of the poorest survival. However, the magnitude of the difference in survival between SSM and NM is substantial, and may provide further evidence that the two histologic types are quite separate disease processes. We present sufficient data on other forms of melanoma, Hutchinson's melanotic freckle and acral lentiginous melanoma to estimate their survival relative to the more common NM and SSM, which had not been presented elsewhere, to our knowledge, due to the comparative rarity of their presentation.

Substantial geographic variation in melanoma survival exists, which probably reflects access to care (it does not reflect racial or sex differences in survival), socioeconomic status (which is certainly related to melanoma incidence but which we were unable to measure), availability of screening, or awareness of melanoma as a problem. We do not find much evidence that the areas most likely to have active skin screening programs in place, such as Los Angeles, have substantially better survival than the median.

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