Clinical Medicine Insights: Dermatology

ORIGINAL RESEARCH

Cutaneous Melanoma Incidence and Survival Among Black, Asian and Pacific Islander and White Populations in the United States

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Abstract: Cutaneous melanoma incidence and survival among U.S. blacks, Asian-Pacific Islanders (API) and whites were examined. Frequency distributions and age-adjusted incidence rates (cases per 100,000) by race, sex, anatomic subsite, histology and stage (frequency distribution only) and age-specific incidence rates were calculated for primary invasive cutaneous melanoma diagnosed in 1995–2001 from 36 U.S. population-based cancer registries (n = 138,725). Rate ratios with 95% confidence intervals comparing anatomic subsite and histology rates among APIs and blacks with whites were calculated. Five-year cause-specific survival rates by sex, race and histology were calculated using data from 17 Surveillance, Epidemiology and End Results registries. API and black incidence rates were lower than the white rate for males (2.1 and 1.2, respectively, versus 20.6) and females (1.6 and 0.9 versus 13.6). Within each sex-race group, incidence rates generally increased with age; the increase was greatest for white males. Rate ratios for anatomic subsites and histologies were statistically significantly low, except black male and female and API male rate ratios for acral lentiginous histology. Five-year cause-specific survival rates were lowest for black males and females (77%), followed by API males (79%) and API females (84%). Further elucidation of risk factors for cutaneous melanoma in blacks and APIs and for the acral lentiginous histology in all races could assist in the design of measures to prevent and detect cutaneous melanoma.

Keywords: melanoma, incidence, survival, race, United States

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Introduction

The American Cancer Society estimated that in the U.S. in 2009, over 68,000 new cases of cutaneous melanoma would be diagnosed and over 8,650 persons would die of the disease, representing 4.6% of all newly diagnosed cancer cases and 1.5% of all cancer deaths.[1] Cutaneous melanoma occurs predominantly in whites; an estimated 94% of the cases are white.[2] In the U.S., the cutaneous melanoma average annual age-adjusted incidence rate among men of all races was 22 per 100,000 in 2001–2005 versus 8.5 in 1975.[3] The increase in male melanoma incidence contrasts markedly with the time-trends of many other common cancers in men, e.g. lung, colorectal, bladder, oral, and stomach, which have been declining. Among women, the cutaneous melanoma annual average age-adjusted incidence rate was 14.2 per 100,000 in 2001–2005 compared to 7.4 in 1975.[3] As with men, the incidence rate for many other common cancers in women decreased during this time, e.g. breast, colorectal, endometrial, and ovarian. The five-year relative survival rate for cutaneous melanoma significantly improved between the periods 1975–1979 and 1995–2000, from 78% to 89% among men and 87% to 92% among women.[4]

It is well documented that cutaneous melanoma incidence, mortality, and survival rates are much higher in the white population than in black and Asian and Pacific Islander (API) populations.[3–5] The distribution of cutaneous melanoma by demographic and clinical characteristics such as sex, age, anatomic subsite, histology, tumor thickness and stage at diagnosis among whites also is well known.[6] Very little has been published regarding the descriptive epidemiology of cutaneous melanoma among black and API populations using population-based cancer registry data.[7–9] One study using National Cancer Institute (NCI) Surveillance, Epidemiology and End Results (SEER) data provided statistics by race, but not sex,[7] another included data only for California[8], and a third study also using SEER data included only acral lentiginous melanoma cases.[9] These population-based cancer registry studies and other hospital patient series studies identified racial differences in the distributions of anatomic subsites and histologies.[7–13] Previous studies also found that cutaneous melanoma in non-white populations is more likely to be diagnosed at a later stage than in the white population.[7–14]

In this study we used a large, high quality data set of population-based cancer registries covering large proportions of U.S. black and API populations to compare cutaneous melanoma incidence among blacks, APIs and whites by sex. U.S. cutaneous melanoma survival data by race and sex also are presented.

Methods

Data sources and specifications

The North American Association of Central Cancer Registries (NAACCR) analytic data file used in this study included demographic and diagnostic information on incident cases of cutaneous melanoma diagnosed in 1995–2001, from 33 state and 3 metropolitan U.S. population-based cancer registries that are participants in the SEER Program, National Cancer Institute and/or the National Program of Cancer Registries, Centers for Disease Control and Prevention. These registries' data met the NAACCR inclusion criteria for case completeness, timeliness and data quality as measured by percent of cases with unknown age, sex or race and percent of death certificate only cases. The NAACCR data standards also include the use of SEER multiple primary rules whereby patients are counted for each diagnosis of a primary cancer. The registries gave consent to NAACCR for their data to be used in this study and the NAACCR Institutional Review Board determined that the study was exempt from full Board review.

The 36 registries were Alabama, Alaska, Arizona, Colorado, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Washington, West Virginia, Wisconsin, Wyoming, Greater Bay Area (California), Los Angeles (California), and Washington D.C. These registries covered 51% of whites, 44% of blacks, and 58% of APIs in the 2000 U.S. population.

All primary invasive melanoma of the skin cases (ICD-O-3 site code = C440–C449, histology code = 8720–8790, behavior code 3[15]) in the NAACCR analytic data file were included except cases identified through death certificate or autopsy record only, of unknown histology or not microscopically confirmed (n = 1,929, 1.3%). American Indian and Alaskan

Native cases also were excluded from the analysis due to small numbers (n = 188) as were cases of other or unknown race (n = 5,425), with 138,725 cases (95% of 146,267) remaining. For the age-specific incidence analysis, the age group 0–29 (n = 7,314) was excluded due to small numbers for blacks and APIs. The NAACCR analytic data file did not include *in situ* cases. Hispanics were not analyzed separately because the NAACCR analytic data file contained accurate ethnicity information (Hispanic, non-Hispanic) on too few of the cases. Hispanics were included in their race category, e.g. white Hispanics were included with whites.

Statistical methods

Cutaneous melanoma frequency distributions and average annual age-adjusted incidence rates by race (black, API, white) for each sex were calculated for four anatomic subsites (head and neck, trunk, upper limb and shoulder, lower limb and hip) and four histologies (nodular, superficial spreading, lentigo maligna, acral lentiginous). Rate ratios with 95% confidence intervals were calculated to compare rates for anatomic subsites and histologies among APIs, blacks and whites.[16] Average annual age-specific incidence rates for five-year age groups (30–34, 35–39, ... 85+) and frequency distributions by stage at diagnosis (local, regional, distant, unknown) for each sex-race group also were calculated. All age-adjusted incidence rates were directly age-adjusted using the 2000 U.S. population standard (19 age groups) and are expressed as number of cases per 100,000 population. Annual population estimates by age, sex, and race for the rate calculations were those provided by the Census Bureau to the SEER Program.[17]

The Kaplan-Meier estimator was used to calculate five-year cause-specific survival rates for cutaneous melanoma by race, sex, and histology using data from the seventeen registries currently participating in NCI's SEER Program.[18] Only cases diagnosed in 1995 through 2001, microscopically confirmed and the first primary were included. The vital status, and the cause of death if deceased, for each case is updated annually by the participating registries; all cases were followed through December 31, 2005. Five-year cause-specific survival rates were calculated instead of relative survival rates because reliable life expectancy tables were not available for the API population to generate valid relative survival rates. All analyses were conducted using NCI's software, SEER*Stat.[19,20]

Results

Incidence by sex, race and age

Of 138,725 eligible primary invasive cutaneous melanoma cases diagnosed in the study area in 1995–2001, 653 (0.5%) were API, 812 (0.6%) black, and 137,260 white (98.9%). Males represented 49%, 48%, and 57% of API, black and white cases, respectively. Among males, API and black average annual age-adjusted incidence rates were lower than the white rate by a factor of ten or more; 2.1 and 1.2, respectively, versus 20.6. The same race pattern held for females, although female average annual age-adjusted incidence rates were lower than analogous male rates; 1.6 for APIs and 0.9 for blacks compared to 13.6 for whites.

Age-specific incidence curves (Fig. 1, Table 1) show that in every age group, black and API men and women had much lower cutaneous melanoma incidence rates than white men and women. Black and API men and women had similar cutaneous melanoma incidence rates in every age group, except that in age groups older than 65–69 API male rates were higher than API female and black male and female rates. Within each sex-race group incidence rates generally increased with age; the increase was much greater for white males than for any other group. Although younger (30–44 years old) white females had higher rates than younger white males, by age group 45–49 the white male rate was higher than the white female rate and became increasingly higher than the white female rate with each subsequent age group.

Anatomic subsite incidence by sex and race

The distribution of cutaneous melanoma by anatomic subsite varied greatly among the different sex-race groups. Black males had nearly equal percentages of cutaneous melanoma on the upper body (43%) and the lower body (45%), while most of the cutaneous melanomas in API and white males occurred on the upper body, 64% and 85%, respectively. Black women had a much lower proportion of upper body cutaneous melanomas than API or white women (28% vs. 56% and 65%, respectively). Within each

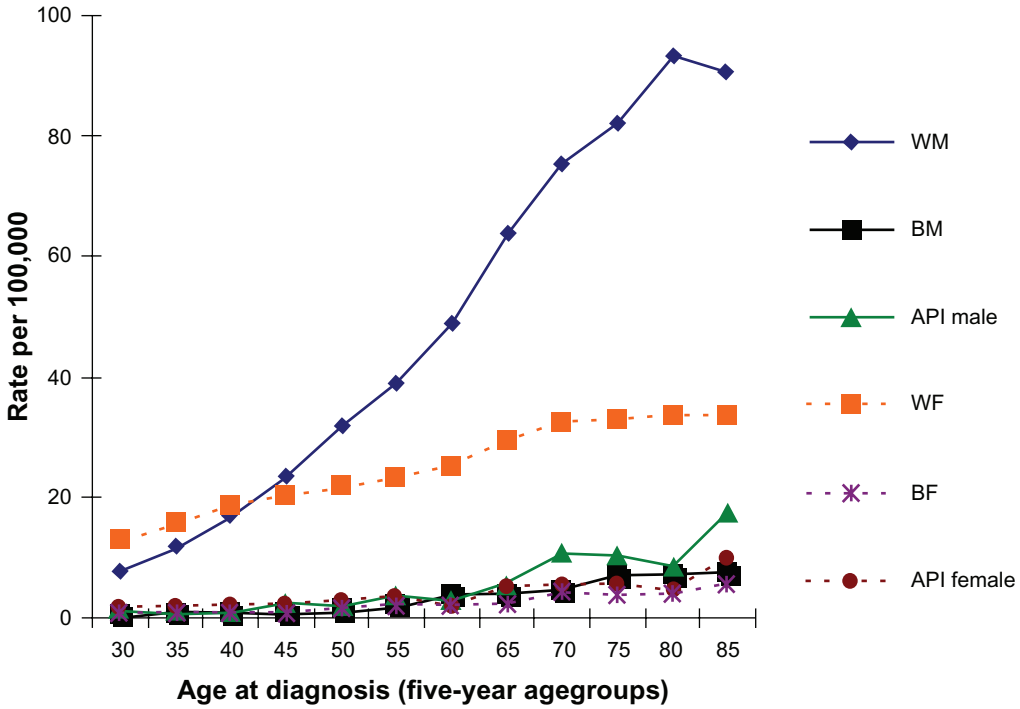

Figure 1. Cutaneous Melanoma Average Annual Incidence Rates by Sex, Race and Age—U.S., 1995–2001.[1]
Notes: [1]Cases for which the reporting source was unknown, were death certificate or autopsy record only, and not microscopically confirmed were excluded (n = 1,929). American Indian and Alaskan Native cases were excluded (n = 188) as were cases of other or unknown race (n = 5,425). Cases age 0–29 were excluded (n = 7,314). Total n = 131,411. Five year age groups were 30–34, 35–39, … 85+. Data sources are population-based cancer registries covering: 1995–2001—Arizona, Greater Bay Area, Los Angeles, Colorado, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, Rhode Island, Utah, Washington, West Virginia, Wisconsin, Wyoming; 1996–2001—Alaska, Montana, Oregon; 1997–2001—Delaware, Washington DC, Massachusetts, Oklahoma, South Carolina; 1998–2001—Alabama, Missouri 1999–2001—Georgia, New Hampshire.
Abbreviations: WM, white male; WF, white female; API, Asian and Pacific Islander; BM, black male; BF, black female.

Table 1. Cutaneous melanoma average annual incidence rates by sex, race and age—U.S., 1995–2001.[1]

Age	Male			Female		
	Black n = 362	API n = 298	White n = 75,401	Black n = 393	API n = 301	White n = 54,656
30–34	0.3	0.7	7.8	0.4	1.3	12.9
35–39	0.5	0.7	12.0	0.4	1.3	15.9
40–44	0.6	1.3	17.1	0.7	1.7	18.5
45–49	0.8	2.3	23.4	0.8	1.7	20.4
50–54	1.2	2.2	31.7	0.7	2.1	21.9
55–59	1.8	3.5	38.8	1.6	3.1	23.0
60–64	3.7	3.0	48.8	2.1	2.3	25.0
65–69	3.9	5.6	63.9	2.3	4.6	29.3
70–74	4.6	10.7	75.6	3.7	4.8	32.5
75–79	7.2	10.4	82.2	3.9	5.7	32.8
80–84	7.0	8.4	93.2	4.3	4.9	33.5
85+	7.5	17.4	90.5	5.8	9.5	33.6

Notes: [1]Cases for which the reporting source was unknown, were death certificate or autopsy record only, and not microscopically confirmed were excluded (n = 1,929). American Indian and Alaskan Native cases were excluded (n = 188) as were cases of other or unknown race (n = 5,425). Cases age 0–29 were excluded (n = 7,314). Total n = 131,411. API = Asian and Pacific Islander. Data sources are population-based cancer registries covering: 1995–2001—Arizona, Greater Bay Area, Los Angeles, Colorado, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, Rhode Island, Utah, Washington, West Virginia, Wisconsin, Wyoming; 1996–2001—Alaska, Montana, Oregon; 1997–2001—Delaware, Washington DC, Massachusetts, Oklahoma, South Carolina; 1998–2001—Alabama, Missouri, 1999–2001—Georgia, New Hampshire. The average annual incidence rates are age-adjusted to the 2000 U.S. population and expressed as cases per 100,000.

race group males had much higher percentages of upper body melanomas, specifically on the trunk and head and neck, than females (Table 2). Rate ratios for API and black males compared to white males were smaller for each anatomic subsite on the upper body (from 0.03 to 0.08) than the rate ratios for the lower body (>0.30). The same was true of women's rate ratios, with a range of rate ratios similar to men's for upper body subsites (0.02 to 0.11) but much smaller rate ratios than men's rate ratios for the lower body (<0.15). All the rate ratios were statistically significant (Table 3).

Histology incidence by sex and race

For API and white men and women, superficial spreading cutaneous melanoma represented the largest specified histology followed by nodular, whereas among black males and females acral lentiginous was the most frequent specified histology followed by superficial spreading (Table 2). Over half the cutaneous melanoma cases were of unspecified histology, ranging from 53%–60% in the different sex-race groups. Within each race group the distribution of histology was similar for men and women. The rate ratios for API and black males compared to white males were very low (from 0.02 to 0.13) and statistically significant for all specified histologic types, except acral lentiginous rate ratios were not statistically significant. Rate ratios for API and black women compared to white women were similar to those for men; however the acral lentiginous rate ratio for API women compared to white women was statistically significantly low (Table 3).

Stage at diagnosis and survival by sex and race

Black women and men had the largest percentages of their melanomas diagnosed at the distant (metastatic) stage, 14%, followed by API males and females, 7% and 6%, respectively, and white males and females, 5% and 3%, respectively (Table 4).

The cutaneous melanoma five-year cause-specific survival rate was lowest for black males and females (77%), followed by API males at 79% and API females

Table 2. Cutaneous melanoma percent distribution of anatomic subsite and histology by sex and race—U.S., 1995–2001.[1]

	Male			Female		
	Black n = 388	**API n = 323**	**White n = 78,106**	**Black n = 424**	**API n = 330**	**White n = 59,154**
Anatomic Subsite						
Upper body	42.8%	64.1%	85.4%	27.5%	55.8%	65.3%
Trunk (445)	(18.3%)	(29.4%)	(38.1%)	(8.7%)	(25.5%)	(24.8%)
Upper limb and shoulder (446)	(12.9%)	(15.8%)	(21.7%)	(11.3%)	(19.7%)	(25.8%)
Head and neck (440–444)	(11.6%)	(18.9%)	(25.6%)	(7.5%)	(10.6%)	(14.7%)
Lower limb and hip (447)	44.8%	24.1%	8.6%	59.0%	35.5%	30.7%
Overlapping/unknown (448, 449)[2]	12.4%	11.8%	6.0%	13.4%	8.8%	4.1%
Histology						
Superficial spreading (8743)	12.1%	19.2%	25.9%	11.1%	20.0%	30.6%
Nodular (8721)	7.0%	9.3%	8.0%	6.1%	7.6%	6.7%
Acral lentiginous (8744)	16.0%	6.5%	0.8%	19.6%	6.1%	1.2%
Lentigo maligna (8742)	–	5.9%	7.0%	–	–	5.1%
Other	4.6%	5.0%	4.5%	5.9%	4.2%	3.6%
Malignant melanoma NOS[3] (8720)	59.5%	54.2%	53.7%	55.1%	59.7%	52.8%

Notes: [1]Cases for which the reporting source was unknown, were death certificate or autopsy record only, and not microscopically confirmed were excluded (n = 1,929). American Indian and Alaskan Native cases (n = 188) and cases of other or unknown race (n = 5,425) were excluded. Total n = 138,725. API = Asian and Pacific Islander. Data sources are population-based cancer registries covering:1995–2001—Arizona, Greater Bay Area, Los Angeles, Colorado, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, Rhode Island, Utah, Washington, West Virginia, Wisconsin, Wyoming, 1996–2001—Alaska, Montana, Oregon, 1997–2001—Delaware, Washington DC, Massachusetts, Oklahoma, South Carolina. 1998–2001—Alabama, Missouri. 1999–2001—Georgia, New Hampshire; [2]110 (0.1%) are overlapping for males and 80 (0.1%) are overlapping for females, the remainder are unknown; [3]NOS, not otherwise specified.
–, Percentages based on counts fewer than 16 were suppressed.

Table 3. Cutaneous melanoma average annual incidence rates and rate ratios for anatomic subsites and histologies by sex and race—U.S., 1995–2001.[1]

	Male			Female		
	Black n = 388	API n = 323	White n = 78,106	Black n = 424	API n = 330	White n = 59,154
	AAIR (RR)[2]	AAIR (RR)[2]	AAIR[2]	AAIR (RR)[2]	AAIR (RR)[2]	AAIR[2]
Anatomic Subsite						
Upper body						
Trunk (445)	0.19 (0.02)	0.54 (0.07)	7.68	0.07 (0.02)	0.40 (0.11)	3.49
Upper limb and shoulder (446)	0.13 (0.03)	0.33 (0.07)	4.45	0.10 (0.03)	0.34 (0.10)	3.48
Head and neck (440–444)	0.14 (0.03)	0.45 (0.08)	5.47	0.07 (0.04)	0.20 (0.11)	1.86
Lower limb and hip (447)	0.58 (0.33)	0.56 (0.32)	1.74	0.56 (0.13)	0.57 (0.14)	4.20
Histology						
Superficial spreading (8743)	0.13 (0.02)	0.38 (0.07)	5.24	0.10 (0.02)	0.30 (0.07)	4.27
Nodular (8721)	0.08 (0.05)	0.22 (0.13)	1.67	0.06 (0.07)	0.14 (0.16)	0.87
Acral lentiginous (8744)	0.21 (1.31)[3]	0.15 (0.94)[3]	0.16	0.19 (1.19)[3]	0.10 (0.63)	0.16
Lentigo maligna (8742)	–	0.15 (0.10)	1.51	–	–	0.62

Notes: [1]Cases for which the reporting source was unknown, were death certificate or autopsy record only, and not microscopically confirmed were excluded (n = 1,929). American Indian and Alaskan Native cases (n = 188) and cases of other or unknown race (n = 5,425) were excluded. Cases with overlapping/unknown anatomic subsites (n = 4,792) were not included in the anatomic subsite categories and cases with a histology of other (n = 2,084) or malignant melanoma not otherwise specified (n = 27,837) were not included in the histology categories. API = Asian and Pacific Islander. Data sources are population-based cancer registries covering: 1995–2001—Arizona, Greater Bay Area, Los Angeles, Colorado, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, Rhode Island, Utah, Washington, West Virginia, Wisconsin, Wyoming, 1996–2001—Alaska, Montana, Oregon, 1997–2001—Delaware, Washington DC, Massachusetts, Oklahoma, South Carolina, 1998–2001—Alabama, Missouri, 1999–2001—Georgia, New Hampshire; [2]The average annual incidence rates (AAIR) are age-adjusted to the 2000 U.S. population and expressed as cases per 100,000. The rate ratios (RR) compare the API and black rates to the white rates; all RRs are statistically significant at the 95% level (i.e. the 95% confidence intervals do not include 1) except where noted; [3]The rate ratio (RR) is not statistically significantly different from 1.
–, Rates based on counts fewer than 16 were suppressed.

at 84%. There was greater variation in survival rates in women, 77% to 93%, than in men, 77% to 88%. The survival rate also varied greatly by histology, with the lowest rates for nodular and acral lentiginous and the highest rates for superficial spreading and lentigo maligna (whites only), 90% or more for each sex-race group (Table 5).

Discussion

Cutaneous Melanoma Incidence

In this study, cutaneous melanoma incidence rates were much lower in black and API populations than in the white population and lower for women compared to men within each race, consistent with previous findings.[3,7,8] The much lower incidence of cutaneous melanoma among blacks and APIs than whites has been attributed partly to differences in host factors and exposure to risk factors, particularly lower sun sensitivity and less sun exposure.[8]

A striking finding, similar to other studies,[21,22] was the very large increase in white male incidence rates with age, much greater than in any other sex-race group including white females, whose incidence rates were higher than white males from ages 30–44 (the data were not analyzed for age groups younger than 30). This age-specific pattern may be partly explained by sex-race differences in solar ultraviolet radiation (UVR) exposure, e.g. a study of solar UVR doses to Americans that excluded outdoor workers found that men had a higher average dose per year than women.[23] Also, sex-race differences in occupational exposures associated with cutaneous melanoma such as solar UVR, artificial UVR, coal tars and pitches, polychlorinated biphenyls, and vinyl chloride may explain some of the sex-race differences in cutaneous melanoma incidence.[24,25]

Black women and black men had much lower percentages of cutaneous melanomas on the upper body, 28% and 43%, respectively, than the other groups. The majority of cutaneous melanomas among APIs and whites occurred on the upper body, particularly the trunk and head and neck for API and white men. These results are consistent with a previous study that provided anatomic subsite information

Table 4. Cutaneous melanoma stage at diagnosis by sex and race—U.S., 1995–2001.[1]

Sex/Race	Local		Regional		Distant		Unknown	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Male								
Black	234	60.3	54	13.9	56	14.4	44	11.3
API	214	66.3	41	12.7	24	7.4	44	13.6
White	61,185	78.3	5,978	7.7	3,670	4.7	7,260	9.3
Female								
Black	249	58.7	59	13.9	58	13.7	58	13.7
API	248	75.2	28	8.5	21	6.4	33	10.0
White	48,994	82.8	3,507	5.9	1,742	2.9	4,904	8.3

Notes: [1]Cases for which the reporting source was unknown, were death certificate or autopsy record only, and not microscopically confirmed were excluded (n = 1,929). American Indian and Alaskan Native cases (n = 188) and cases of other or unknown race (n = 5,425) were excluded. Total n = 138,725. API = Asian and Pacific Islander. Data sources are population-based cancer registries covering: 1995–2001—Arizona, Greater Bay Area, Los Angeles, Colorado, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, Rhode Island, Utah, Washington, West Virginia, Wisconsin, Wyoming, 1996–2001—Alaska, Montana, Oregon, 1997–2001—Delaware, Washington DC, Massachusetts, Oklahoma, South Carolina, 1998–2001—Alabama, Missouri, 1999–2001—Georgia, New Hampshire.

by sex and race, not just by race.[8] The differences in anatomic subsite distribution in males versus females has been attributed to sex differences in parts of the body that are typically exposed to the sun.[5,25] That whites of either sex have a higher proportion of upper body melanomas than their counterparts is consistent with blacks, and to a lesser extent APIs, having a greater percentage of acral lentiginous melanomas which more likely occur on the lower part of the body.

Within each race the histology distribution was remarkably similar for both sexes, especially given the different anatomic site distributions for men and women of each race. Similar to other studies, the distribution by histology was different for blacks than for APIs or whites, with acral lentiginous the most frequent histology among blacks.[7–9,11,13] However, acral lentiginous was the only histology with similar incidence rates (and rate ratios not significantly different from 1) among the sex-race groups (except API females), also noted previously.[8] Previous studies also found that acral lentiginous melanomas occur on non-sun-exposed body areas such as the palms of the hands, soles of the feet, fingers, toes, and nailbeds.[8,25]

The similar acral lentiginous melanoma incidence rates across the sex-race groups suggest a risk factor(s) for this histology that is different than the risk factors for the other histologies, with similar exposure(s) in each sex-race group. One such possible risk factor is skin injury. A case-control study of melanoma of the feet and hands diagnosed from 1987–1993 in white adults residing in Australia or Scotland found that acral melanoma was strongly associated with penetrative injury of the feet or

Table 5. Cutaneous melanoma five-year cause-specific survival by histology, sex and race—U.S., 1995–2001.[1]

Histology	Male			Female		
	Black n = 116	API n = 155	White n = 23,399	Black n = 117	API n = 173	White n = 18,911
Superficial spreading (8743)	100.0%	93.3%	94.7%	100.0%	90.0%	97.6%
Acral lentiginous (8744)	80.0%	56.3%	78.0%	89.7%	–	88.8%
Nodular (8721)	–	80.0%	67.6%	–	–	78.6%
Lentigo maligna (8742)	–	–	96.6%	–	–	98.3%
Total[2]	76.8%	78.7%	87.7%	77.4%	84.3%	93.1%

Notes: [1]Five-year cause-specific rates were calculated using the Kaplan-Meier estimation method and data from Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence—SEER 17 Regs Limited-Use + Hurricane Katrina Impacted Louisiana Cases, Nov 2007 Sub (1973–2005 varying)—Linked to County Attributes—Total U.S., 1969–2005 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2008, based on the November 2007submission. Cases were followed through December 31, 2005. API = Asian and Pacific Islander; [2]Other and malignant melanoma not otherwise specified (n = 20,573) histologies are included in the total.
–, Rates based on counts fewer than 16 were suppressed.

hands.[26] An earlier case-control study of plantar melanoma (melanoma of the foot sole, 66.5% were acral malignant melanomas) in Paraguay found that the most strongly associated risk factor was reported injuries.[27] The authors of the first-mentioned study speculated that local penetrative injury may promote acral melanoma through stimulation of melanocytic cells by the fibroblast growth factor abundant in healing wounds.[26] Both studies also found significant associations with occurrence of nevi on the soles of feet,[26,27] and the Paraguay study found an association with an outdoor workplace[27] while the Australian/Scotland study found associations with high total nevi counts, heavy exposure to agricultural chemicals, sun-sensitive complexion, cumulative sun exposure and history of non-melanoma skin cancer.[26]

Cutaneous melanoma survival

Black men and women had the poorest five-year cause-specific survival rate, which likely relates to the relatively high proportion of their cutaneous melanomas diagnosed at the distant stage. It also may be related to blacks having high proportions of acral lentiginous melanomas. Consistent with other studies, we found that survival is poorer for acral lentiginous than superficial spreading melanoma in all three race groups.[5] Lower survival rates among blacks and APIs compared to whites may be related to less screening, lack of or limited access to treatment, differences in treatment, socioeconomic status (SES) and/or more aggressive tumors.[7] Investigators in a recent study using California cancer registry data and controlling for many demographic and clinical factors concluded that low SES independently predicts lower survival from cutaneous melanoma. However, among blacks low survival was not explained by differences in treatment or SES.[28]

Strengths and limitations

This study utilizes the largest available population-based data source to examine the descriptive epidemiology of cutaneous melanoma in U.S. black and API populations. The study population is most representative of the U.S. population, covering over 44% of the black and 58% of the API populations in the U.S. The cases included met the NAACCR data quality criteria.

However some limitations should be noted. Although the total eligible cases numbered 138,750, less than two percent of the cases were black or API. Thus, caution must be exercised in interpreting some of the results for these groups. Although anatomic site coding in the NAACCR data file distinguishes among various subsites within the two larger categories of upper limb and shoulder and lower limb and hip, we did not use the finer subsite categories due to low numbers of black and API cases. Including the finer subsite categories would have allowed for more specific comparisons among the sex-race groups and with previous studies. Also, caution should be exercised in interpreting the histology results as a large proportion of the cases were malignant melanomas not otherwise specified—53% to 60% depending on the sex-race group. The most current incidence data were not used (most recent diagnosis year was 2001) in order to allow five years of follow-up for the survival analysis.

Cutaneous melanoma is believed to be underreported to central cancer registries, especially by non-hospital facilities where melanoma cases are increasingly diagnosed and treated.[29–32] A recent assessment of cutaneous melanoma case reporting for whites showed that the SEER registries had more complete cutaneous melanoma case ascertainment than non-SEER registries in two diagnosis time periods, 1992–1994 and 1995–1997.[33] However, between the two time periods the non-SEER registries appeared to increase their cutaneous melanoma case ascertainment and thus completeness of reporting,[33] probably at least partly by improved reporting among non-hospital facilities.[29,33] The distribution of reporting sources for the cutaneous melanoma cases in the NAACCR data file used for this study was similar for the SEER and non-SEER registries. Almost 80 percent of the non-SEER cases were reported by hospitals versus 78 percent of the SEER cases. Corresponding lower percentages of the non-SEER cases vs. SEER cases were reported by laboratories or physician offices (19% vs. 22%). Although reporting of melanoma cancer cases to population-based cancer registries has improved in recent years, underreporting may continue and if the underreporting differs by race or geographic area it could be a major limitation in this study, as well as in previous population-based studies.

With the 2001 incidence data, the coding system used for summary stage changed to Summary Stage 2000 (SS 2000); Summary Stage 1977 (SS 1977) was used for the years prior to 2001. A study on the effect of the coding change found that for cutaneous melanoma SS 2000 assigned fewer cases to the local stage than SS 1977 (85.6% vs. 87.8%) and more cases to the regional stage (7.5% vs. 5.3%). The percentages of distant and unknown stage remained unchanged.[34] The stage data in this study were probably relatively unaffected by the coding change since only one year of data using Summary Stage 2000 was included in this study and distant stage percentages appeared to be unchanged by the coding change in Summary Stage.

Conclusions

The findings from this study, using a large, representative, high-quality U.S. population-based data set, confirm results from the few previous, more limited population-based studies of cutaneous melanoma among non–white populations. U.S. black and API populations have a lower incidence of cutaneous melanoma than U.S. whites and there are very different age, anatomic subsite and histology distributions between the sexes and/or among the races, thought to be due mostly to different susceptibilities and exposures to UVR. However, all the sex-race groups had similar incidence rates of acral lentiginous cutaneous melanoma, suggesting similar exposures to a common risk factor(s). Further elucidation of risk factors for cutaneous melanoma in blacks and APIs and for the acral lentiginous histology in all races could assist in the design of measures to prevent and detect cutaneous melanoma, especially among black and API populations.

Although melanoma is rare among blacks and APIs compared to whites, it is more likely to be fatal, at least partly due to diagnosis at a later stage. Education of the medical community and the public about cutaneous melanoma in black and API populations, specifically its occurrence on non-sun-exposed parts of the body and how to check for it, is needed to increase early detection which can result in less extensive treatment and greater survival.[1]

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Disclosure

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers of this paper report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material.

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