STUDY

Melanoma in Middle-aged and Older Men

A Multi-institutional Survey Study of Factors Related to Tumor Thickness

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Objectives: To identify factors related to the detection of melanoma and to determine those that differ between thinner vs thicker tumors in middle-aged and older men.

Design: Survey.

Setting: Three institutional melanoma clinics.

Participants: Men 40 years or older who had newly diagnosed invasive melanoma.

Main Outcome Measures: Differences in melanoma awareness, skin examination practices, discovery patterns, and social/medical care factors relative to tumor thickness.

Results: Two hundred twenty-seven men completed surveys within 3 months of melanoma diagnosis; 57 (25.1%) had thicker tumors (>2.00 mm). Thicker tumors were associated with nodular histologic features (43.9%), a lack of atypical nevi, having less than a high school education, and patient vs physician (dermatologist or nondermatologist) detection. Knowledge of melanoma ($P=.007$), attention to skin cancer detection information ($P=.02$), an interest in health topics ($P=.003$), and knowing the importance of physician skin examination ($P=.05$) were more common in those with thin tumors. Tumor thickness did not correlate with age, anatomic location, marital/cohabitation status, prior skin cancer, or sun sensitivity. Overall patient awareness of melanoma warning signs, skin self-examination practices, and Internet use were poor (<20%, <50%, and <14%, respectively).

Conclusions: Physician discovery, the patient's higher level of education and detection-promoting awareness and attitudes, and the presence of clinically atypical nevi were related to thinner melanomas. Innovative outreach strategies and novel educational campaigns incorporating these factors, coupled with sharper messages regarding the importance of physician screening, are needed to improve early detection in middle-aged and older men.

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INCIDENCE AND MORTALITY RATES for melanoma are steadily increasing for middle-aged and older men.[1-3] Nearly 50% of all melanoma deaths in the United States are in white men 50 years or older.[4] Clinical management and outcome for primary cutaneous melanoma is strongly predicted by tumor thickness at diagnosis.[5,6] The incidence of the thickest tumors (≥4.00 mm) during the past decade has increased only in men 60 years or older.[7] From 1973 to 2002, mortality rates rose by 64% in US white men aged 55 to 64 years and by 130% in US white men 65 years or older.[2]

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The disproportionate burden of melanoma deaths in middle-aged and older men is explained in part by sex differences in melanoma knowledge, awareness, and prevention practices.[8,9] Middle-aged and older men may benefit the most from tailored innovative efforts to promote earlier detection and treatment of melanoma. Rigorous assessment of behavioral, social, and medical access factors that differ between men 40 years or older with thinner vs thicker melanomas may identify potential modifiable variables. A clearer understanding of these factors provides fundamental knowledge for additional studies and public health messages aimed at earlier melanoma detection in this high-risk subset of men.

We performed a multi-institutional assessment of behavioral and social factors in men 40 years or older with invasive primary melanoma. Our objective was to identify and determine factors (1) related to the detection of melanoma and (2) that differ between thinner vs thicker melanomas in middle-aged and older men.

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Table 1. Melanoma Thickness According to Site, Tumor Characteristics, and Anatomic Location in 227 Men

	No. (%) of Patients	Median Tumor Thickness, mm[a]	Tumor Thickness, mm, No. (%) of Patients				Row	Test of Differences[b]
			≤1.00 (n=115)	1.01-2.00 (n=55)	2.01-4.00 (n=38)	≥4.01 (n=19)		
Institutional site								
UM	165 (72.7)	0.93	90 (54.5)	39 (23.6)	24 (14.5)	12 (7.3)	a	**b**
SUMC	46 (20.3)	1.68	12 (26.1)	14 (30.4)	14 (30.4)	6 (13.0)	b	**a**, **c**
VAPAHCS	16 (7.0)	0.60	13 (81.3)	2 (12.5)	0	1 (6.3)	c	**b**
Stage								
Early (IA and IB)	169 (74.4)	0.68	115 (68.0)	54 (32.0)	0	0	a	**b**
Late (IIA, IIB, and IIC)	58 (25.6)	3.15	0	1 (1.7)	38 (65.5)	19 (32.8)	b	**a**
Histologic subtype								
SSM	124 (54.6)	0.67	84 (67.7)	26 (21.0)	13 (10.5)	1 (0.8)	a	**b**, **d**, e, f, **g**
NM	39 (17.2)	2.75	2 (5.1)	12 (30.8)	10 (25.6)	15 (38.5)	b	**a**, **c**, d, f, **g**
LMM	28 (12.3)	0.55	22 (78.6)	3 (10.7)	3 (10.7)	0	c	**b**, **d**, **e**, f, **g**
Nevoid	9 (4.0)	1.60	0	6 (66.7)	3 (33.3)	0	d	**a**, b, **c**
DM	6 (2.6)	2.89	1 (16.7)	2 (33.3)	2 (33.3)	1 (16.7)	e	a, **c**
ALM	6 (2.6)	1.54	1 (16.7)	3 (50.0)	2 (33.3)	0	f	a, b, c
Other or unclassified[c]	15 (6.6)	1.50	5 (33.3)	3 (20.0)	5 (33.3)	2 (13.3)	g	**a**, **b**, **c**
Location[d]								
Arms	52 (23.2)	1.13	25 (48.1)	16 (30.8)	10 (19.2)	1 (1.9)	a	
Back	80 (35.7)	0.90	45 (56.3)	22 (27.5)	6 (7.5)	7 (8.8)	b	
Chest	20 (8.9)	1.04	10 (50.0)	4 (20.0)	5 (25.0)	1 (5.0)	c	
Face	34 (15.2)	1.65	14 (41.2)	7 (20.6)	10 (29.4)	3 (8.8)	d	
Head and neck	16 (7.1)	0.70	10 (62.5)	1 (6.3)	1 (6.3)	4 (25.0)	e	
Legs	22 (9.8)	1.50	9 (40.9)	5 (22.7)	5 (22.7)	3 (13.6)	f	
Side[d]								
Front	97 (43.3)	0.95	44 (45.4)	23 (23.7)	22 (22.7)	8 (8.2)	a	
Back	127 (56.7)	1.30	69 (54.3)	32 (25.2)	15 (11.8)	11 (8.7)	b	
Ulceration								
Nonulcerated	190 (83.7)	0.83	113 (59.5)	49 (25.8)	20 (10.5)	8 (4.2)	a	**b**
Ulcerated	37 (16.3)	2.80	2 (5.4)	6 (16.2)	18 (48.6)	11 (29.7)	b	**a**

Abbreviations: ALM, acral lentiginous melanoma; DM, desmoplastic melanoma; LMM, lentigo maligna melanoma; NM, nodular melanoma; SSM, superficial spreading melanoma; SUMC, Stanford University Medical Center; UM, University of Michigan; VAPAHCS, Veterans Affairs Palo Alto Health Care System.

[a] Median tumor thickness for all patients was 1.00 mm.

[b] Indicates test of differences in log-transformed tumor thickness between categories of each factor in row order. Letters indicate significant differences at $P<.05$ in comparison with other categories; boldface indicates $P<.01$. For example, in the comparison by site, the b in row a indicates that there is a significant difference in tumor thickness between rows a and b at $P<.01$; the absence of c indicates that there is no difference between a and c at $P<.05$.

[c] Includes 1 spitzoid melanoma, 1 atypical melanocytic proliferation, and 13 unspecified.

[d] Patient data were missing for location (3 patients) and side (3).

METHODS

Institutional review board approval for case ascertainment was obtained at Stanford University Medical Center (SUMC), Veterans Affairs Palo Alto Health Care System (VAPAHCS), and the University of Michigan (UM). Eligible, consecutive patients were surveyed in the melanoma clinics of these institutions from September 1, 2004, through January 31, 2006.

Men 40 years or older with a diagnosis of invasive primary melanoma were surveyed within 3 months of the initial diagnosis. Patients with in situ, mucosal, genital, perianal, ocular, and unknown primary melanoma were excluded. Melanoma in situ was excluded because of its high frequency of diagnosis and relatively low-risk biological behavior and to allow balanced comparison between thinner and thicker invasive melanomas. Eligible patients were identified before the melanoma clinic visit. In all cases, a dermatopathologist at the academic center confirmed the histologic diagnosis and Breslow depth. Eligible patients were contacted by telephone before their clinic appointment or approached at the initial visit to discuss survey participation. Interested patients were asked to complete a self-administered survey in the clinic, before the melanoma consultation and after providing informed consent.

Tables 1, **2**, **3**, **4**, and **5** list the detailed data obtained, including patient demographics and characteristics, melanoma tumor characteristics, and specific survey questions related to melanoma discovery, patient awareness and attitudes, medical access, skin cancer examination, and sources of health information. Sun sensitivity was defined by the frequency of sunburn after midday summer sun exposure without sun protection; individuals who responded "always" or "usually" were coded as sun sensitive. For applicable questions, respondents were asked to refer to the period 1 year before the diagnosis. Subjects were clinically staged at diagnosis according to the primary tumor characteristics before sentinel lymph node biopsy, which was performed in eligible patients.[4]

The data were analyzed with stratification according to 4 thickness categories using the following American Joint Committee on Cancer 2002 melanoma staging[5] T classification tumor cutoff points: 1.00 mm or thinner (T1); 1.01 to 2.00 mm (T2); 2.01 to 4.00 mm (T3); and >4.00 mm (T4). In some analyses, groups were aggregated into patients with thinner (≤2 mm) and thicker (>2 mm) tumors. Variations in tumor thickness by study measures were evaluated statistically using ordinary least squares means regression to test for differences in log-transformed tumor thickness between categories of each factor. A critical test value of $P<.05$ was used through-

Table 2. Melanoma Thickness According to Patient Characteristics and Melanoma Discovery in 227 Men

	No. (%) of Patients	Median Tumor Thickness, mm[a]	Tumor Thickness, mm, No. (%) of Patients[b] ≤1.00 (n=115)	1.01-2.00 (n=55)	2.01-4.00 (n=38)	≥4.01 (n=19)	Row	Test of Differences[c]
Age, y[d]								
<55	68 (30.0)	1.10	33 (48.5)	20 (29.4)	12 (17.6)	3 (4.4)	a	
55-64	59 (26.0)	0.72	35 (59.3)	11 (18.6)	9 (15.3)	4 (6.8)	b	
65-74	46 (20.3)	1.16	21 (45.7)	12 (26.1)	9 (19.6)	4 (8.7)	c	
≥75	51 (22.5)	1.10	24 (47.1)	12 (23.5)	7 (13.7)	8 (15.7)	d	
Education[d]								
<High school	8 (3.6)	3.76	1 (12.5)	2 (25.0)	1 (12.5)	4 (50.0)	a	**b**, **c**, **d**, **e**
High school or GED certificate	71 (31.7)	1.00	36 (50.7)	3 (18.3)	14 (19.7)	8 (11.3)	b	**a**
Some college	30 (13.4)	1.16	14 (46.7)	11 (36.7)	5 (13.3)	1 (3.3)	c	**a**
College graduate	59 (26.3)	1.00	30 (50.8)	18 (30.5)	8 (13.6)	3 (5.1)	d	**a**
Postgraduate	56 (25.0)	0.91	32 (57.1)	11 (19.6)	10 (17.9)	3 (5.4)	e	**a**
Married or living with partner								
Yes	183 (80.6)	0.99	90 (49.2)	46 (25.1)	32 (17.5)	15 (8.2)	a	
No	44 (19.4)	1.05	25 (56.8)	9 (20.5)	6 (13.6)	4 (9.1)	b	
Sun sensitive								
Yes	99 (43.6)	0.95	52 (52.5)	26 (26.3)	15 (15.2)	6 (6.1)	a	
No	128 (56.4)	1.06	63 (49.2)	29 (22.7)	23 (18.0)	13 (10.2)	b	
Atypical nevi[d]								
Yes	52 (23.7)	0.60	36 (69.2)	8 (15.4)	4 (7.7)	4 (7.7)	a	**b**
No	167 (76.3)	1.15	76 (45.5)	44 (26.4)	32 (19.2)	15 (9.0)	b	**a**
Prior skin cancer								
Yes	58 (25.6)	0.98	30 (51.7)	13 (22.4)	12 (20.7)	3 (5.2)	a	
No	169 (74.4)	1.00	85 (50.3)	42 (24.9)	26 (15.4)	16 (9.5)	b	
Family history of melanoma								
Yes	41 (18.1)	0.95	22 (53.7)	10 (24.4)	6 (14.6)	3 (7.3)	a	
No	186 (81.9)	1.01	93 (50.0)	45 (24.2)	32 (17.2)	16 (8.6)	b	
Discovered by[d]								
Dermatologist	39 (20.0)	0.70	28 (71.8)	7 (17.9)	2 (5.1)	2 (5.1)	a	**d**
Nondermatologist/other health care provider	19 (9.7)	0.58	14 (73.7)	3 (15.8)	0	2 (10.5)	b	d
Spouse/partner/other	53 (27.2)	0.98	29 (54.7)	10 (18.9)	10 (18.9)	4 (7.5)	c	
Self	84 (43.1)	1.43	28 (33.3)	28 (33.3)	20 (23.8)	8 (9.5)	d	**a**, b

Abbreviation: GED, General Educational Development.
[a] Median tumor thickness for all patients was 1.00 mm.
[b] Because of rounding, percentages may not total 100.
[c] Explained in footnote *b* of Table 1.
[d] Patient data were missing for age (3 patients), education (3), atypical nevi (8), and discovered by (32).

out the analysis. To minimize redundancy, in most cases, specific *P* values are not described in the text but are found in the tables. To control for potential confounding by study site, parallel analyses were run with the institutional site as a random effect in mixed regression models; the results were nearly identical and are not presented herein.

The 11 questions on patient attitudes regarding melanoma detection were summarized further using factor analysis. Exploratory factor analysis with varimax rotation and limiting the analysis to factors with eigenvalues greater than 1.0 yielded 2 distinct factors (awareness or interest and confidence or no perceived barriers to discovery). We evaluated the internal consistency of identified factors by computing Cronbach α correlations. Factor scores were calculated and analyzed for groups defined by tumor thickness.

RESULTS

Of 266 men offered the survey, 227 completed it (refusal rate, 14.7%). Refusals were related to patients' lack of interest in completing the survey, being too busy, visual impairment, or anxiety related to melanoma diagnosis. Approximately 70% were surveyed within 1 month of melanoma diagnosis and the remainder within 3 months. Five patients (2.2%) were nonwhite (2 Asians/Pacific Islanders, 2 American Indians/Native Alaskans, and 1 Hispanic/Latino patient). In all, 207 men (91.2%) reported this as their first melanoma, and 168 (74.0%) denied having prior nonmelanoma skin cancer. Median tumor thickness was 1.00 mm among the 3 sites; 57 men (25.1%) had melanomas >2.00 mm. Most men (169 [74.4%]) had stage IA or IB cancer (early stage) and 58 (25.6%) had later stage cancer (IIA, IIB, and IIC) at diagnosis. Referral patterns differed for the following 3 sites: (1) SUMC evaluated a lower proportion of stage IA melanomas because sentinel lymph node biopsy-eligible referrals (≥1.0-mm thickness, stage IB+) predominated; (2) VAPAHCS evaluated more stage IA melanomas owing to an increased proportion of lentigo maligna melanoma (LMM) subtype[10]; and (3) UM evaluated a population-based sample representative of the state (concordant with the state registrar), with thinner tumors predominating because most

Table 3. Melanoma Thickness According to Patient Awareness and Attitudes in 227 Men[a]

Survey Statement	No. (%) of Patients Affirming	Median Tumor Thickness in Those Affirming, mm[b]	Tumor Thickness, mm				*P* Value[c]
			≤1.00 (n=115)	1.01-2.00 (n=55)	2.01-4.00 (n=38)	≥4.01 (n=19)	
1. I had heard of melanoma	212 (93.4)	0.98	112 (97.4)	50 (90.9)	33 (86.8)	17 (89.5)	.007
2. I had heard of the ABCD rule	36 (15.9)	0.80	22 (19.1)	8 (14.5)	4 (10.5)	2 (10.5)	
3. A physician or nurse previously talked to me about melanoma	91 (40.1)	0.90	52 (45.2)	19 (34.5)	14 (36.8)	6 (31.6)	
4. I paid attention to my health	190 (83.7)	0.89	105 (91.3)	44 (80.0)	28 (73.7)	13 (68.4)	.002
5. I regularly took interest in reading or watching stories about health topics	128 (56.4)	0.91	74 (64.3)	30 (54.5)	18 (47.4)	6 (31.6)	.003
6. I would never have thought of myself at risk for melanoma	95 (41.9)	1.05	46 (40.0)	25 (45.5)	13 (34.2)	11 (57.9)	
7. I felt it was important to have a physician examine my skin for signs of melanoma	155 (68.3)	0.93	85 (73.9)	40 (72.7)	19 (50.0)	11 (57.9)	.05
8. I carefully paid attention to information about skin cancer detection	165 (72.7)	0.90	92 (80.0)	37 (67.3)	26 (68.4)	10 (52.6)	.02
9. I read information about skin cancer detection	148 (65.2)	0.95	80 (69.6)	36 (65.5)	21 (55.3)	11 (57.9)	
10. I talked with a physician about skin cancer	115 (50.7)	0.93	64 (55.7)	26 (47.3)	15 (39.5)	10 (52.6)	
11. I was confident that I knew the difference between melanoma and ordinary skin growths	47 (20.7)	1.00	24 (20.9)	12 (21.8)	6 (15.8)	5 (26.3)	
12. I would have known what kind of moles to look for if I examined my skin	56 (24.7)	0.90	31 (27.0)	13 (23.6)	10 (26.3)	2 (10.5)	
13. My eyesight affected my ability to perform skin self-examinations	14 (6.2)	0.74	9 (7.8)	1 (1.8)	2 (5.3)	2 (10.5)	
14. I was uncomfortable about asking someone to look at moles in areas I could not easily see	17 (7.5)	1.20	8 (7.0)	5 (9.1)	3 (7.9)	1 (5.3)	
Mean factor scores[d]							
Awareness, interest (questions 4-10)			51.2	48.1	44.6	40.1	.02[e]
Confidence, no barriers (questions 11-14)			34.0	33.0	32.1	31.6	

Abbreviation: ABCD, *a*symmetry, *b*order, *c*olor, and *d*iameter.
[a] All questions were asked relative to the 12-month period before melanoma diagnosis.
[b] Median tumor thickness for all patients was 1.00 mm.
[c] Indicates test of differences in log-transformed tumor thickness between those who affirmed the question and those who did not. Only *P* values less than .05 are shown.
[d] Indicates unit-weighted factor scores standardized to range from 0 (worst) to 100 (best); factor scores are linear combinations of all variables contributing to the factor.
[e] Indicates test of differences in mean factor scores across groups of tumor thickness.

of the patients from referral practices were referred regardless of stage.

TUMOR CHARACTERISTICS

The majority of tumors were of the superficial spreading melanoma (SSM) histologic subtype (124 tumors [54.6%]), followed by nodular (NM) (39 [17.2%]), LMM (28 [12.3%]), nevoid (9 [4.0%]), acral lentiginous (ALM) (6 [2.6%]), and desmoplastic (DM) (6 [2.6%]) subtypes. Fifteen melanomas (6.6%) were classified as other or unclassified subtype. Twenty-five of 57 thicker tumors (>2.00 mm) (43.9%) were NM, which accounted for 15 of the 19 tumors >4.00 mm (78.9%). Three of the 6 DM tumors (50.0%) were >2.00 mm (Table 1). The SSM and LMM histologic subtypes were associated with thinner tumors (≤2.00 mm) at diagnosis. Anatomic location and anterior or posterior (front or back) location of the primary tumor were not associated with tumor thickness. Of the 37 ulcerated tumors, 29 (78.4%) were >2.00 mm (Table 1).

PATIENT CHARACTERISTICS AND MELANOMA DISCOVERY

Patient age ranged from 40 to 88 (median, 62) years. Tumor thickness did not correlate with age, anatomic location, marital/cohabitation status, prior skin cancer, personal or family history of skin cancer, or sun sensitivity (Table 2). Men with the least amount of education (ie, <high school) had thicker melanomas compared with those in all other educational strata. The presence of clinically atypical nevi (52 of 219 respondents [23.7%]) correlated with thinner tumors with a median depth of 0.60 mm compared with 1.15 mm without atypical nevi (*P*=.02).

Differences were found in tumor thickness based on who discovered the melanoma in 195 men for whom this information was available. Melanomas discovered by a physician (29.7%) were thinner (median depth, 0.60 mm) than melanomas discovered by the patient's spouse or partner (median depth, 0.98 mm) or by the patient himself (median depth, 1.43 mm) (Table 2). Excluding NM, 94.2% of melanomas found by physicians were no thicker

Table 4. Melanoma Thickness According to Medical Access and Skin Cancer Examination in 227 Men[a]

Survey Question	No. (%) of Patients Affirming	Median Tumor Thickness in Those Affirming, mm[b]	Tumor Thickness, mm, No. (%) of Patients			
			≤1.00 (n=115)	1.01-2.00 (n=55)	2.01-4.00 (n=38)	≥4.01 (n=19)
Did you have any health insurance?	217 (95.6)	1.00	110 (95.7)	54 (98.2)	35 (92.1)	18 (94.7)
Government health insurance	104 (45.8)	1.06	51 (44.3)	25 (45.5)	16 (42.1)	12 (63.2)
Private health insurance	150 (66.1)	0.98	79 (68.7)	37 (67.3)	24 (63.2)	10 (52.6)
HMO health insurance	35 (15.4)	1.05	16 (13.9)	8 (14.5)	7 (18.4)	4 (21.1)
Was there a place that you usually went when you were sick?	207 (91.2)	1.00	105 (91.3)	48 (87.3)	36 (94.7)	18 (94.7)
Did you have a regular physician?	199 (87.7)	1.00	102 (88.7)	48 (87.3)	35 (92.1)	14 (73.7)
≥2 Physician visits in year before diagnosis	194 (85.5)	1.00	98 (85.2)	48 (87.3)	32 (84.2)	16 (84.2)
If you visited a physician, did he or she perform a full-body skin examination (head, trunk, arms, legs, hands, and feet, excluding genitalia)?	80 (35.2)	1.06	39 (33.9)	25 (45.5)	12 (31.6)	4 (21.1)
Was it part of the physician's routine physical examination?	81 (35.7)	1.17	37 (32.2)	23 (41.8)	15 (39.5)	6 (31.6)
Was it because you were concerned about skin cancer?	49 (21.6)	0.98	25 (21.7)	11 (20.0)	9 (23.7)	4 (21.1)
Did a partner or other person think you should be screened?	40 (17.6)	0.90	23 (20.0)	7 (12.7)	8 (21.1)	2 (10.5)
Did your physician think you should be screened for skin cancer?	43 (18.9)	1.05	21 (18.3)	14 (25.5)	5 (13.2)	3 (15.8)
Did you request a skin examination?	56 (24.7)	0.87	34 (29.6)	14 (25.5)	6 (15.8)	2 (10.5)
Had you ever attended a health fair or a workplace health program to test for skin cancer?	9 (4.0)	1.10	4 (3.5)	2 (3.6)	2 (5.3)	1 (5.3)
Did a physician test you for colon cancer?	129 (56.8)	0.95	70 (60.9)	29 (52.7)	19 (50.0)	11 (57.9)
Had you used a home kit to test for stool blood?	86 (37.9)	0.94	47 (40.9)	22 (40.0)	9 (23.7)	8 (42.1)
Did a physician test you for prostate cancer?	156 (68.7)	1.01	78 (67.8)	41 (74.5)	25 (65.8)	23 (63.2)
Had you ever attended a health fair to test your blood pressure?	84 (37.0)	0.93	46 (40.0)	22 (40.0)	10 (26.3)	6 (31.6)
Had you ever attended a health fair to test for diabetes?	28 (12.3)	0.95	15 (13.0)	7 (12.7)	2 (5.3)	4 (21.1)
Did you carefully examine all of your moles?	108 (47.6)	0.99	57 (49.6)	27 (49.1)	18 (47.4)	6 (31.6)
Did a family member or friend closely look at the moles on your back?	116 (51.1)	1.04	57 (49.6)	25 (45.5)	22 (57.9)	12 (63.2)
Did you use a picture or photograph of moles to help you look at your own moles?	25 (11.0)	1.20	11 (9.6)	6 (10.9)	3 (7.9)	5 (26.3)
Had you ever been instructed or given materials on how to look at your skin for signs of melanoma?	60 (26.4)	0.86	38 (33.0)	10 (18.2)	9 (23.7)	3 (15.8)

Abbreviation: HMO, health maintenance organization.

[a] All questions were asked relative to the 12-month period before melanoma diagnosis. A test of differences in log-transformed tumor thickness was performed between those who affirmed the question and those who did not. Only the *P* value for having private health insurance was significant (*P* = .05).

[b] Median tumor thickness for all patients was 1.00 mm.

than 2.00 mm. No significant difference between discovery by a dermatologist (median depth, 0.70 mm) or a nondermatologist physician (median depth, 0.58 mm) was found. Parallel analyses adjusting for physician discovery by institutional site demonstrated nearly identical results (data not shown).

PATIENT AWARENESS AND ATTITUDES

Prediagnosis awareness of melanoma warning signs and skin self-examination practices were poor in all patients (<20% and <50%, respectively). Thinner tumors correlated with men who had heard of melanoma (*P* = .007), paid attention to their health (*P* = .002), regularly took interest in reading or watching stories about health topics (*P* = .003), believed it was important to have a physician examine their skin for signs of melanoma (*P* = .05), and carefully paid attention to information about skin cancer detection (*P* = .02). There was no relationship between tumor thickness and confidence to identify melanoma or perceived barriers to its discovery (Table 3).

MEDICAL ACCESS AND SKIN CANCER EXAMINATION

In our study sample, 95.6% of men had health insurance and 87.7% had a regular physician (Table 4). Thicker tumors were associated with a lack of private health insurance (*P* = .05). Nonsignificant trends for thicker tumors were noted with lower frequencies of having a regular physician, receiving a full-body skin examination by a physician in the year before diagnosis, being taught how to perform a skin self-examination, requesting a skin examination by a physician, having a spouse/partner suggest skin

Table 5. Melanoma Thickness According to Sources of Health Information in 227 Men[a]

Sources of Health Information	No. (%) of Patients Affirming	Median Tumor Thickness in Those Affirming, mm[b]	Tumor Thickness, mm, No. (%) of Patients			
			≤1.00 (n=115)	1.01-2.00 (n=55)	2.01-4.00 (n=38)	≥4.01 (n=19)
Request educational materials about skin cancer detection from physician	11 (4.8)	0.90	8 (7.0)	1 (1.8)	1 (2.6)	1 (5.3)
Prediagnosis source of skin cancer information						
Physician's office	120 (52.9)	1.00	61 (53.0)	30 (54.5)	19 (50.0)	10 (52.6)
Internet	31 (13.7)	0.70	20 (17.4)	6 (10.9)	4 (10.5)	1 (5.3)
Television	95 (41.9)	0.90	56 (48.7)	20 (36.4)	11 (28.9)	8 (42.1)
Radio	35 (15.4)	0.90	21 (18.3)	8 (14.5)	4 (10.5)	2 (10.5)
Pamphlets	81 (35.7)	0.81	48 (41.7)	18 (32.7)	12 (31.6)	3 (15.8)
Newspaper	88 (38.8)	0.89	51 (44.3)	22 (40.0)	8 (21.1)	7 (36.8)
Weekly magazines	69 (30.4)	0.95	37 (32.2)	19 (34.5)	9 (23.7)	4 (21.1)

[a] We performed a test of differences in log-transformed tumor thickness between those who affirmed the question and those who did not. Only the *P* value for pamphlets as a prediagnosis source of skin cancer information was significant (*P*=.02).
[b] Median tumor thickness for all patients was 1.00 mm.

screening, and performing a skin self-examination (Table 4). In the year before the melanoma diagnosis, 85.5% reported 2 or more physician visits, with a full-body skin examination reported in 35.2% of these visits. In addition, 24.7% of men reported that they had requested skin examination in the year before the diagnosis.

SOURCES OF HEALTH INFORMATION

Television and written materials (the newspaper) were the most commonly used health information sources for skin cancer information (41.9% and 38.8%, respectively), with the use of pamphlets as the only significant health information source correlating with thickness (41.7% in T1 vs 15.8% in T4 melanomas [*P*=.02]). Internet use was low overall (13.7%) and declined with thicker tumors (17.4% in T1 vs 5.3% in T4 melanomas) (Table 5).

COMMENT

Our results identify and determine several factors related to the detection of melanoma and that differ between thinner vs thicker melanomas in men 40 years or older. Thinner tumors were associated with (1) physician detection, (2) a higher melanoma awareness and certain health preventive attitudes, (3) a higher level of education, and (4) the presence of atypical nevi. Internet use was low, and the use of pamphlets was the only health information source that correlated with thinner tumors. Thicker tumors correlated with the nodular subtype.

Our study, specifically designed to examine the subset of high-risk middle-aged and older men, is concordant with others[11-20] that demonstrate that physicians detect thinner melanomas than do patients and spouses/partners. Unlike other reports that assessed physician specialty,[14,18,19,21] our data did not demonstrate significant differences in thickness between dermatologist and nondermatologist detection, but an ample primary care and specialty physician supply in our metropolitan areas, despite differences in referral patterns, may affect this result compared with sparsely populated, rural areas.

Nationally, access to dermatologists for routine screening of those at risk for melanoma is suboptimal.[21,22] Primary care physicians are often the front line of contact for patients in the health care system. For white men 40 years or older in particular, earlier detection of melanoma should occur if the primary care physician and other health providers are able to recognize melanoma, facilitate referrals for persons with suspected lesions, and educate patients about melanoma detection. More education is needed because our data showed that at-risk patients had many missed opportunities for skin cancer examinations by a physician in the year before the diagnosis.

Professional education should (1) emphasize the value and practice of the skin cancer examination for all levels of health care providers, including physicians-in-training, and (2) promote primary care physician screening and education of patients at high risk of developing melanoma, including those with clinically atypical nevi and white, middle-aged and older men.[23] It is hoped that the gap between primary care physician and specialist melanoma screening and detection is declining with heightened awareness and education in our study period, compared with earlier periods from previous reports.[14,18,19,21] Skin self-examination practices were only weakly associated with thinner tumors in our study, suggesting that requesting a physician examination may be more effective than performing a skin self-examination for early detection. Our results support a public health strategy that targets the combination of patients requesting full-body skin examinations and physicians performing them more often, particularly among their high-risk patients.

Although histologic subtype may not represent an independent prognostic factor after controlling for tumor thickness,[24-26] NM accounts for a disproportionate number of thicker melanomas[27-31] and is more likely to be self-detected.[14,32] The ABCD (*a*symmetry, *b*order, *c*olor, and *d*iameter) criteria[33] may be insufficient for promoting early detection of many tumors of the NM subtype.[34] Knowledge of the ABCD rule was not associated with thinner tumors in our study. Recent addition of E for *e*volving may assist with earlier NM detection.[35] The acronym EFG for *e*levated, *f*irm, and *g*rowing progressively for more than

a month has also been suggested as an adjunct to the ABCD criteria to enhance detection of the NM subtype.[36] At our centers, the use of *d*ifference for D has been expanded to represent different from other skin lesions or lacking family resemblance compared with other nevi, similar to the ugly duckling sign.[37,38] Improved methods are needed to determine how to detect NM earlier.

Because nearly all respondents had health insurance and a regular physician, health care access did not appear to influence melanoma thickness in our study. Although the number of men with the thickest tumors (>4.00 mm) was small, the influence of less education was evident. Of the men with T4 tumors at diagnosis, 63.2% (12 of 19) had no more than a high school education. Our results confirm other reports[32,39-41] that have shown an inverse correlation with melanoma thickness and level of education, melanoma awareness, and health preventive attitudes.

Our analysis supports the use of written materials such as pamphlets for middle-aged and older men and demonstrated low Internet use in this subgroup, consistent with a 2005 study[42] in which only 12% of patients 60 years and older searched for the term *melanoma* on the Internet after their diagnosis compared with nearly half of those younger than 40 years.

Our results showed a correlation of thinner tumors with the presence of atypical nevi. This finding suggests that, although patients with atypical nevi are at higher risk, they may require less focus as targets for screening campaigns.[43] The presence of atypical nevi may already be associated with greater knowledge and awareness of melanoma risk in these patients.[17]

Study limitations include reliance on self-reports of melanoma awareness, discovery and health information–seeking practices, and recall bias. Although most of the men completed surveys within 1 month after the primary melanoma diagnosis, the overreporting of health prevention practices before diagnosis is a possibility. However, the relatively low rates for risk reduction practices overall slightly mitigates this concern. We also relied on self-report of atypical nevi and did not corroborate this with a review of medical records or objective verification. In terms of recall accuracy, studies have demonstrated bias primarily when cancer cases are compared with noncancer controls but little difference related to the stage of disease in those with a cancer diagnosis.[44] Strengths include the geographical diversity of the data collected, low rates of case refusal, and the short interval between diagnosis and completion of the survey. Thickness trends persisted in analyses adjusted for study site and particularly by physician discovery of the melanoma, suggesting that differences in physician practice (referral bias) were not likely to be a confounding factor.

CONCLUSIONS

A recent analysis of 4785 patients with cutaneous melanoma found that men and older persons were most likely to have tumors >2.00 mm with histologic ulceration and lower disease-specific survival and prompted a call for expanded preventive efforts to these subgroups.[45] However, successful outreach strategies in middle-aged and older men are contingent on a better understanding of factors related to tumor thickness. For men 40 years or older, who constitute more than half of all melanoma deaths in the United States, we have identified at least 2 key variables (physician skin examination and improved public awareness, particularly for patients in lower socioeconomic groups) as major targets for new interventions to promote earlier melanoma detection. Physician education should consider intensive efforts to teach the skin cancer examination in medical schools and in primary care residency programs and should test innovative methods of distance learning and academic detailing for currently practicing physicians. Public education, in particular targeting less-educated, middle-aged and older men for improved self-examination and physician skin surveillance, should become an integral component of skin cancer risk reduction strategies promoted by cancer advocacy organizations. Our results add information and insights for larger validation studies and tailored public health messages aimed at men of this age group.[46] Ultimately, they should have important implications for reducing melanoma mortality.

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