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CLINICAL REPORT

Clinicopathological Analysis of 1571 Cutaneous Malignant Melanomas in Valencia, Spain: Factors Related to Tumour Thickness

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Epidemiological studies on cutaneous melanoma in Mediterranean countries are scarce. Our aim was to perform a descriptive analysis of melanoma cases diagnosed in Valencia, Spain, and to evaluate the relationship between Breslow thickness and some clinical features. A total of 1571 patients with histologically confirmed cutaneous malignant melanoma diagnosed at the two main referral melanoma centres were evaluated retrospectively. For each patient the following clinical and pathological characteristics were selected: age, gender, anatomic site, histogenetic type, Breslow thickness, presence of ulceration, the stage, and symptoms such as bleeding, changes in size and colour, altered sensations and previous traumas. Chi-squared tests were performed together with logistic regression to evaluate the relationship of variables with tumour thickness. Tumour thickness was independently correlated with increasing age, presence of bleeding, location on hand or foot, and presence of altered sensations. Female sex and presence of a change in colour were associated with thin melanomas. Ideally, public awareness campaigns concerning the risks that exist should be aimed at subgroups such as men and people of an advanced age who generally present with thicker tumours. Emphasis should be placed on irregularities or changes in pigmentation, as these appear to be the first indicators of the development of a melanoma. *Key words: melanoma; epidemiology; thickness; Breslow; public awareness campaigns.*

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Over the last several decades, the worldwide incidence of melanoma in Caucasians has increased markedly (1). As higher incidence rates of melanoma have been found in countries with a predominantly fair-skinned population, most studies show clinical and pathological characteristics of melanoma in these populations (2–8). In contrast, little is known about the epidemiological features in Southern European populations, where darker phototypes are more frequent (9–15). It is generally accepted that Breslow's thickness of the lesion is the most accurate single prognostic factor of primary melanoma (2, 16, 17). Some studies have reported demographic and clinical variables that correlate with tumour thickness (2, 3, 10, 13, 18–22). However, few of these demonstrated a correlation between Breslow thickness and the clinical features on initial diagnosis of a patient with melanoma (13, 19, 22). All of these clinical and demographic features are basically considered when designing public awareness campaigns about the risks of melanoma.

The aims of this study were to carry out a descriptive analysis of melanoma cases diagnosed in Valencia, Spain and to evaluate the relationship between Breslow thickness and some demographic and clinical features.

PATIENTS AND METHODS

We retrospectively studied patients with melanomas treated in the Departments of Dermatology of the Hospital General Universitario (HGUV) and the Instituto Valenciano de Oncología (IVO) from 1983 to 2001. The database in each centre was the origin of the data used in the study. The retrieval of information was facilitated by the fact that both applications shared the same database design and, therefore, the criteria for categorizing all the clinical and pathological variables that are considered in the study. Both databases contained melanoma patients with clinical data (including those signs and symptoms analysed in this study) and pathological data (including Breslow thickness as a continuous variable, histogenetic type and the presence of ulceration, among others) prospectively recorded in the databases since January 1983. Of all the patients referred, only those with the original biopsy specimen available were registered in those databases.

A total of 1571 patients were evaluated. The clinical and pathological data were obtained for each patient. Clinical characteristics included age, gender, anatomic site of the primary tumour, stage at diagnosis and the presence of signs and symptoms. Age was considered as a continuous variable and was categorized in five groups. The anatomic sites were defined as follows: head or neck, upper extremities, trunk, lower extremities, hand or foot, and other sites. The symptoms presented were changes in size, bleeding, change of colour, altered sensations and/or traumas. Histological variables comprised histogenetic type, Clark level of invasion, tumour thickness of Breslow and ulceration. All tumours were classified as superficially spreading melanoma (SSM), lentigo malignant melanoma (LMM), nodular melanoma (NM), acral lentiginous melanoma (ALM) or unclassified/unknown. Tumour thickness

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was considered as a continuous variable and categorized according to the most recently recommended breakpoints (17): ≤1 mm, 1.01–2.00 mm, 2.01–4.00 mm, >4 mm. Only tumours ulcerating through the full thickness of the epidermis were classified as ulcerated. Lymph node status was determined by either therapeutic or prophylactic/elective dissection before 1998 and after this date by sentinel lymph node dissection.

In order to analyse changes in melanoma characteristics over time, two period groups were considered: 1983–1990 and 1991–2001.

Statistics

The data collected were analysed using the SPSS statistical package (SPSS Inc. Version 10.0.6, 1999: Chicago, IL, USA). Chi-squared tests were performed to evaluate the differences in distribution of age, sex, anatomic site, histogenetic type, and the presence of clinical features related to Breslow thickness. Thin (≤1.00 mm) and thick (>4.00 mm) Breslow thickness proportions were analysed by univariate and multivariate logistic regression.

RESULTS

Demographic characteristics

Clinical and pathological features of the overall population (OP) and of each gender are shown in Table I.

At the time of diagnosis, the majority of cases (79.9%, 1255/1571) appeared to be non-metastatising irrespective of their anatomic site. Most melanomas *in situ* (42.5%, 51/120) were located on the head or neck. Moreover, the highest percentage of melanomas *in situ* were found in these sites (15% of all melanomas diagnosed on the head and neck). Regional lymph node (RLN) metastasis presented a higher rate in the lower extremities (14.6%, 45/308), particularly in the distal limbs (21.6%, 29/134). Distant metastasis at diagnosis was not found in the melanomas located on upper extremities, one case was found among lower extremity melanomas, and three cases were found in hand or foot sites.

When considering different age groups, it was remarkable that in patients under 20 years of age melanomas were mostly present on the trunk region (59.5%, 22/37). Middle-aged patients (40–60 years) presented a high percentage of melanomas on the lower extremities (24.7%, 138/558), although the trunk remained the most frequently affected site (40.5%, 226/558). Interestingly enough, in older patients melanomas predominated on the head or neck area, affecting 32.9% (179/544) of patients aged between 61 and 80 years, and 52.1% (50/96) of those over 80 years. These same age subgroups also presented a high percentage of melanomas located on hands or feet (12.7% [69/554] and 15.6% [15/96], respectively). Variations in the location of the affected site were considered to be related to some degree to the predominant histogenetic type (Table II). Thus, LMM predominated in the head or neck (85.9%, 183/214), predominantly in elderly patients (median age of 70 years). SSM was found more frequently on the trunk (50.1%, 470/941) and lower extremities (24.1%, 226/941), where the most affected age groups were the younger patients (median age of 47 years for trunk and 48 years for extremities against 56 years in the OP). Differences between the two study periods are shown in Table III.

Table I. Demographic characteristics

Variable	Total No. (%)	Men No. (%)	Women No. (%)
Overall population	1571	712 (45.3)	859 (54.7)
Age			
<20	37 (2.4)	17 (2.4)	20 (2.3)
21–40	329 (20.9)	128 (18.0)	201 (23.4)
41–60	558 (35.5)	261 (36.7)	297 (34.6)
61–80	544 (34.6)	261 (36.7)	283 (32.9)
>80	96 (6.1)	41 (5.8)	55 (6.4)
Unknown	7 (0.4)	4 (0.6)	3 (0.3)
Median, range	56, 12–99	57, 13–94	54, 12–99
Anatomic site			
Head or neck	337 (21.5)	178 (25.0)	159 (18.5)
Upper extremities (hands excluded)	168 (10.7)	58 (8.1)	110 (12.8)
Trunk	597 (38.0)	353 (49.6)	244 (28.4)
Lower extremities (feet excluded)	308 (19.6)	58 (8.1)	250 (29.1)
Hands or feet	134 (8.5)	50 (7.0)	84 (9.8)
Other	11 (0.7)	5 (0.7)	6 (0.7)
Primary unknown	7 (0.4)	5 (0.7)	2 (0.2)
Signs and symptoms of presentation			
Change in size	1076 (68.5)	487 (68.4)	589 (68.6)
Bleeding	378 (24.1)	195 (27.4)	183 (21.3)
Change in colour	269 (17.1)	124 (17.4)	145 (16.9)
Altered sensations	49 (3.1)	20 (2.8)	29 (3.4)
Trauma	137 (8.7)	64 (9.0)	73 (8.5)
Unknown	430 (27.4)		
Ulceration			
Absent	1106 (70.4)	477 (67.0)	629 (73.2)
Present	323 (20.6)	175 (24.6)	148 (17.2)
Unknown	142 (9.0)	60 (8.4)	82 (9.5)
Histogenetic type			
LMM	214 (13.6)	98 (13.8)	116 (13.5)
SSM	941 (59.9)	390 (54.8)	551 (64.1)
NM	276 (17.6)	165 (23.2)	111 (12.9)
ALM	84 (5.3)	34 (4.8)	50 (5.8)
Unclassified	56 (3.5)	25 (2.8)	31 (3.6)
Stage			
Melanoma *in situ*	120 (7.6)	43 (6.0)	77 (9.0)
Localized	1255 (79.9)	561 (78.8)	694 (80.8)
Regional lymph nodes	174 (11.1)	99 (13.9)	75 (8.7)
Distant metastasis	22 (1.4)	9 (1.3)	13 (1.5)
Breslow categories*			
≤ 1 mm	607 (42.0)	238 (35.8)	369 (47.3)
1.01–2 mm	305 (21.1)	136 (20.5)	169 (21.7)
2.01–4 mm	308 (21.3)	171 (25.8)	137 (17.6)
>4 mm	194 (13.4)	107 (16.1)	87 (11.2)
Unknown	30 (2.1)	12 (1.8)	18 (2.3)
Median, range	1.3, 0.06–90	1.6, 0.1–23	1.1, 0.06–90

LMM, lentigo malignant melanoma; SSM, superficial spreading melanoma; NM, nodular melanoma; ALM, acral lentiginous melanoma.

Table II. *Characterization of melanomas by site, histogenetic type and age (median; range)*

Site	Overall		Lentigo malignant melanoma		Superficial spreading melanoma		Nodular melanoma		Acral lentiginous melanoma	
	No. (%)	Age (years)	No. (%)	Age (years)	No. (%)	Age (years)	No. (%)	Age (years)	No. (%)	Age (years)
Head or neck	337 (21.5)	69 (17–99)	183 (85.9)	70 (20–99)	87 (9.3)	55 (18–90)	59 (21.5)	70 (17–94)	0 (0)	
Upper extremities	168 (10.7)	54 (12–85)	8 (3.8)	65 (51–84)	126 (13.4)	52 (12–85)	33 (12.0)	54 (22–85)	0 (0)	
Trunk	597 (38.0)	49 (13–92)	10 (4.7)	65 (26–72)	470 (50.1)	47 (13–92)	102 (37.1)	56 (17–87)	0 (0)	
Lower extremities	308 (19.6)	50 (14–87)	8 (3.8)	59 (28–82)	226 (24.1)	48 (14–87)	66 (24.0)	53 (18–87)	3 (3.6)	71 (40–81)
Hands or feet	134 (8.5)	56 (18–87)	4 (1.9)	68 (38–77)	29 (3.1)	57 (19–87)	15 (5.5)	74 (18–87)	81 (96.4)	68 (33–85)

Breslow thickness

Within the population studied, the proportion of melanomas in each thickness category is shown in Table IV. When taking into account the different clinical features under study, there was no uniformity found in the distribution of the different thickness categories. Thin melanomas represented >40% of those melanomas present in the three subgroups of patients under 60 years (43.0% of those under 20 years [16/37], 45.6% of those patients between 21 and 40 years of age [150/329] and 46.2% of those patients between 41 and 60 years of age [258/558]). Conversely, thick melanomas predominated in the elderly: 55.7% (108/194) of melanomas >4 mm appeared in the 61–80 years subgroup, and 12.4% (24/194) were present in the >80 years subgroup, although these subgroups represented only 34.6% and 6.1% of the OP, respectively.

A higher proportion of men presented thick melanomas (55.2% [107/194] of lesions >4 mm and 55.5% [171/308] of lesions of 2.01–4.00 mm). Most thin melanomas were located on the trunk region (44.3% [268/607] of melanomas ≤1 mm), while a two-fold greater proportion of hand or foot site (16.1% [31/194] vs 8.5% [134/1571] of the OP) was found among thick lesions (>4 mm).

When considering a change in tumour size as the initial symptom diagnosed, there was no significant difference in the proportion of each thickness category. There was a trend to consult because of other symptoms in thicker lesions (categories >1.00 mm). The proportion of patients presenting bleeding or trauma progressively increased according to tumour thickness. In contrast, the proportion of patients referred as a result of changed colour of lesions was higher in thinner tumours. Pruritus or pain was more common in thicker tumours, although the difference was not so evident.

Table V shows the results of logistic regression for both thin and thick tumours. Univariate results were very similar to those of the contingency tables. Multivariate results suggested that increasing age (particularly associated with the 61–80-year-old subgroup, OR 2.55 [95% CI 1.06–6.88], and >80 years, OR 5.72 [95% CI 1.84–17.77] subgroups), hand or foot location (OR 2.70, 95% CI 1.44–5.06), bleeding (OR 13.18, 95% CI 8.59–20.24)

Table III. *Patient characteristics in the two period groups*

Variable	1983–1990 No. (%)	1991–2001 No. (%)
Overall population	482	1089
Age (years)		
<20	12 (2.5)	25 (2.3)
21–40	107 (22.2)	222 (20.5)
41–60	165 (34.2)	393 (36.3)
61–80	174 (36.1)	370 (34.2)
>80	24 (5.0)	72 (6.7)
Median, range	56, 14–94	56, 12–99
Sex		
Men	203 (42.1)	509 (46.7)
Women	279 (57.9)	580 (53.3)
Anatomic site		
Head or neck	118 (24.5)	219 (20.1)
Upper extremities (hands excluded)	45 (9.3)	123 (11.3)
Trunk	151 (31.3)	446 (41.0)
Lower extremities (feet excluded)	118 (24.5)	190 (17.4)
Hands or feet	45 (9.3)	89 (8.2)
Other	4 (0.8)	16 (1.5)
Primary unknown	1 (0.2)	6 (0.6)
Histogenetic type		
Lentigo malignant melanoma	73 (15.2)	141 (13.5)
Superficial spreading melanoma	267 (55.7)	674 (64.4)
Nodular melanoma	102 (21.3)	174 (16.6)
Acral lentiginous melanoma	29 (6.1)	55 (5.3)
Unclassified/unknown	8 (1.7)	2 (0.2)
Breslow categories*		
≤ 1 mm	148 (35.8)	459 (47.5)
1.01–2 mm	93 (20.5)	212 (21.9)
2.01–4 mm	127 (25.8)	181 (18.7)
>4 mm	80 (16.1)	114 (11.8)
Mean	2.8	1.9
Median, range	1.8, 0.06–90	1.1, 0.10–23
Ulceration		
Absent	326 (68.8)	780 (81.7)
Present	148 (31.2)	175 (18.3)
Stage		
Melanoma *in situ*	24 (5.0)	96 (8.8)
Localized	366 (75.9)	889 (81.6)
Regional lymph nodes	89 (17.8)	88 (8.1)
Distant metastasis	6 (1.2)	16 (1.5)

*Melanomas *in situ* are excluded.

Table IV. *Proportion of melanomas in each thickness group according to clinical features*

Variable	Thickness category					
	In situ	≤1 mm	1.01–2 mm	2.01–4 mm	>4 mm	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	*p* value*
Age (years)						
≤20	1 (0.8)	16 (2.6)	5 (1.6)	10 (3.2)	5 (2.6)	<0.0001
21–40	25 (20.8)	150 (24.8)	70 (23.0)	58 (18.8)	16 (8.2)	
41–60	35 (29.2)	258 (42.6)	106 (34.9)	104 (33.8)	41 (21.1)	
61–80	52 (43.3)	162 (26.7)	108 (35.5)	107 (34.7)	108 (55.7)	
w80	7 (5.8)	20 (3.3)	15 (4.9)	29 (9.4)	24 (12.4)	
Sex						
Male	43 (35.8)	238 (39.2)	136 (44.6)	171 (55.5)	107 (55.2)	<0.0001
Female	77 (64.2)	369 (60.8)	169 (55.4)	137 (44.5)	87 (44.8)	
Anatomic site†						
Head or neck	51 (42.5)	117 (19.3)	54 (17.9)	60 (19.7)	50 (25.9)	<0.0001
Upper extremities	8 (6.7)	70 (11.6)	38 (12.6)	33 (10.8)	19 (9.8)	
Trunk	36 (30.0)	268 (44.3)	115 (38.2)	116 (38.0)	56 (29.0)	
Lower extremities	18 (15.0)	121 (20.0)	61 (20.3)	63 (20.7)	37 (19.2)	
Hands or feet	7 (5.8)	29 (4.8)	33 (11.0)	33 (10.8)	31 (16.1)	
Histogenetic type‡						
Lentigo malignant melanoma	55 (46.2)	100 (16.6)	26 (8.8)	17 (5.7)	15 (8.0)	<0.0001
Superficial spreading melanoma	60 (50.4)	470 (78.2)	198 (66.9)	158 (52.8)	48 (25.5)	
Nodular melanoma	0 (0)	13 (2.2)	52 (17.6)	100 (33.4)	108 (57.4)	
Acral lentiginous melanoma	4 (3.4)	18 (3.0)	20 (6.8)	24 (8.0)	17 (9.0)	
Sign/symptom						
Change in size						
Yes	72 (97.3)	408 (95.3)	203 (92.7)	236 (93.7)	155 (93.9)	0.494
No	2 (2.7)	20 (4.7)	16 (7.3)	16 (6.3)	10 (6.1)	
Bleeding						
Yes	1 (1.4)	33 (7.7)	87 (39.7)	143 (56.7)	113 (68.5)	<0.0001
No	73 (98.6)	395 (92.3)	132 (60.3)	109 (43.3)	52 (31.5)	
Change in colour						
Yes	16 (21.6)	131 (30.6)	56 (25.6)	47 (18.7)	18 (10.9)	<0.0001
No	58 (78.4)	297 (69.4)	163 (74.4)	205 (81.3)	147 (89.1)	
Altered sensations						
Yes	1 (1.4)	9 (2.1)	11 (5.0)	18 (7.1)	10 (6.1)	0.011
No	73 (98.6)	419 (97.9)	208 (95.0)	234 (92.9)	155 (93.9)	
Trauma						
Yes	0 (0)	23 (5.4)	37 (16.9)	39 (15.5)	38 (23.0)	<0.0001
No	74 (100)	405 (94.6)	182 (83.1)	213 (84.5)	127 (77.0)	

*p value obtained by chi-squared test.
†Melanomas in other sites are excluded as well as those patients with primary melanoma unknown.
‡Melanomas with unclassified or unknown histogenetic type are excluded.

and altered sensations (OR 2.98, 95% CI 1.31–6.81) were directly and independently related to the presence of melanomas ≥1 mm in thickness. A change in colour (OR 0.66, 95% CI 0.61– 0.93) and female gender (OR 0.53, 95% CI 0.39–0.73) otherwise were generally associated with thinner tumours. Age and bleeding (OR 4.50, 95% CI 3.02–6.70) were the only statistically significant factors related to the presence of thicker tumours (>4 mm). A change in colour (OR 0.43, 95% CI 0.25–0.75) and the female gender (OR 0.65, 95% CI 0.44–0.96) also indicated tumours thinner than 4 mm.

DISCUSSION

Although studies regarding the presence of melanoma have been carried out in other Southern European populations (e.g. Italy) (9, 10, 13–15), few and limited studies on melanoma have been carried out in Spain (11, 12, 23, 24) and they have been almost entirely published in the Spanish literature (12, 23, 24). We describe herein the compilation of the largest amount of data regarding melanoma patients in Spain. These data were obtained from the two main centres in Valencia dedicated to melanoma management. Both centres share the same database design and thus the same criteria for compiling data, while the management of the data was limited to the categorization of continuous variables. It is important to note that this was a retrospective study, particularly for data concerning staging, as the appearance of sentinel lymph node dissection has changed the staging system a great deal. Slight variation in the interpretation of symptoms and the categorization

Table V. *Univariate and multivariate regression of the proportion of thick melanomas with respect to age, sex, site of the melanoma and clinical features**

	Univariat				Multivariate			
	>1 mm		>4 mm		>1 mm		>4 mm	
Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age								
≤20	1.00		1.00		1.00		1.00	
21–40	0.77	0.38–1.54	0.36	0.12–1.04	1.86	0.72–4.80	0.69	0.20–2.42
41–60	0.78	0.39–1.54	0.54	0.20–1.47	1.55	0.62–3.93	0.91	0.28–2.94
61–80	1.60	0.81–3.16	1.77	0.67–4.68	2.70	1.06–6.88	2.55	0.81–8.06
>80	2.72	1.19–6.21	2.32	0.81–6.68	5.72	1.84–17.77	2.94	0.82–10.48
Site								
Head or neck	1.00		1.00		1.00		1.00	
Upper extremities	0.92	0.62–1.36	0.62	0.35–1.10	1.40	0.81–2.41	0.80	0.39–1.62
Trunk	0.76	0.57–1.02	0.52	0.34–0.78	0.99	0.66–1.50	0.79	0.47–1.32
Lower extremities	0.95	0.68–1.33	0.70	0.44–1.11	1.45	0.90–2.34	1.28	0.71–2.30
Hands or feet	2.39	1.48–3.85	1.51	0.91–2.50	2.70	1.44–5.06	1.36	0.73–2.55
Signs/symptoms†								
Bleeding	14.01	9.51–20.65	5.25	3.67–7.52	13.18	8.59–20.24	4.50	3.02–6.70
Change in size	0.69	0.41–1.20	0.95	0.47–1.91	1.24	0.61–2.50	1.37	0.63–2.97
Change in colour	0.53	0.40–0.71	0.35	0.21–0.58	0.66	0.47–0.93	0.43	0.25–0.75
Altered sensations	3.04	1.46–6.35	1.46	0.71–3.00	2.98	1.31–6.81	1.62	0.72–3.62
Trauma	3.85	2.41–6.13	2.42	1.59–3.67	1.09	0.62–1.92	1.26	0.78–2.03
Sex								
Man	1.00		1.00		1.00		1.00	
Woman	0.60	0.47–0.77	0.66	0.48–0.89	0.53	0.39–0.73	0.65	0.44–0.96

*All the terms are mutually adjusted.

†The reference value is the absence of each sign/symptom.

within the contents of the databases of both centres should be borne in mind. Another important aspect that must be considered is the fact that this is not a population-based study; a certain selection bias should be assumed, with *in situ* and thin melanoma almost certainly being under-represented. Recently, trends toward thinner and less invasive melanomas have been observed in some countries (4), as we have also indicated in this study. This perhaps points to another bias in our series that may have influenced the distribution of the Breslow categories to some degree. Differences that are evident through comparisons with other large series that are mostly population-based studies must be interpreted with caution. However, we consider our data, with particular emphasis on the findings related to characteristic clinical symptoms and their relation to Breslow thickness, as highly representative for the specific features of melanoma in Spain.

As regards demographic findings, gender distribution is consistent with other European and Canadian series where females predominate over males (2, 4–6, 14, 25, 26), contrary to Australia, the USA and South Africa (4, 7, 8). Median age at initial diagnosis is similar to other studies (2, 4, 6, 8, 26); most patients were in their fifties, with a trend to earlier detection in women (7, 8).

Location distribution overlapped to some degree with those indicated in other previous worldwide studies (2, 4, 7–9, 14, 25). Noticeably, the prevalence of melanomas on the trunk decreased progressively with increasing age. Conversely, hand or foot and head or neck sites were more common in the elderly. Melanomas on the head or neck were quite frequent in the overall population and particularly in men. Contrary results have been shown in the literature (2, 4, 5, 8, 14, 25–27). This is probably related to the different representation of LMM, which has been identified as more frequent in head or neck melanomas (2, 7) (also see Table II). Although the lower extremities were the most frequent locations in women, this site demonstrated a lower percentage than those found in other series (2, 4, 8, 14, 25). These differences might be related to diverse forms of dressing (28). In the last few years, we have also observed an important increase in the presence of melanoma on the trunk region and a decrease in the lower extremities.

In the present study, tumour thickness distribution was not homogeneous among all the clinical categories. Breslow thickness was considerably affected by age, the proportion of thick lesions progressively increasing with age. The relevance of this influence was stronger when evaluating thick tumours (>4 mm). Also, female gender was significantly associated with thinner tumours, especially with those <1 mm. These findings are consistent with previous studies (3, 10, 13, 19, 22, 29).

Several previous studies have drawn the same conclusion as this study as regards the relationship between tumour thickness and location (3, 15, 19). This is due to the fact that thicker lesions are more likely to occur on

the head or neck and hand or foot sites compared with the trunk or limbs. However, after multivariate analysis considering the other clinical features, its statistical significance only persisted when evaluating thin tumours (1-mm cut-off point).

Interesting associations have been found between some of the investigated signs and symptoms at presentation and Breslow thickness (Table IV). A change in size was by far the most frequently reported clinical sign (94.3%) but had no value when predicting the tumour thickness; while bleeding was the strongest factor indicating thicker tumours (OR 4.5). All of these findings concur with other studies (19, 20). Presentation with a change in colour was associated with thinner tumours and its accuracy was even stronger when indicating tumours <4 mm. This has also been shown in another study (20) and is particularly interesting as this is the only sign which indicates thinner tumours. It has also been indicated that irregular pigmentation is an early sign, suggesting thinner tumours (19). Patients seem to be unaware of the significance of this early indicator, however, and therefore are not concerned by a colour change of a mole, as reflected by a longer patient delay in seeking medical attention (20).

Regarding melanoma prevention, it has been suggested that the focus should be on secondary prevention, which does not reduce melanoma incidence but may reduce melanoma-associated mortality (22). Trends toward thinner and less invasive melanomas have been observed in Australia as a result of high profile public awareness campaigns (4). We have also seen this in our study, almost certainly due to recent efforts to improve public awareness of melanoma in Spain. Additionally, an awareness of melanoma and the related signs and symptoms permitting early detection (30) appears to reduce patients' delay in seeking medical attention (21).

With an increasing incidence of malignant melanoma, it is fundamentally important to increase awareness of the disease among physicians, especially non-dermatologists, and also the general population. Our data demonstrate that the general population cannot be considered as a homogeneous target for educational interventions. Public awareness campaigns should be specifically directed towards those groups that are associated with a high incidence of thicker tumours (2, 4, 7, 9, 14, 22, and this study), i.e. older persons and males in particular. Also, such campaigns should emphasize the recognition of the early signs of melanoma, particularly those referring to irregularities or changes in pigmentation.

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