The Role of Circumstances of Diagnosis and Access to Dermatological Care in Early Diagnosis of Cutaneous Melanoma

A Population-Based Study in France

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Objectives: To describe circumstances of the diagnosis and access to dermatological care for patients with cutaneous melanoma (CM) and to investigate factors associated with early detection.

Design: Retrospective population-based study of incident cases of invasive CM in 2004, using questionnaires to physicians and a survey of cancer registries and pathology laboratories.

Setting: Five regions in northeastern France.

Patients: Six hundred fifty-two patients who were referred to dermatologists by general practitioners (group 1) or by other specialists (group 2), who directly consulted a dermatologist for CM (group 3), or who were diagnosed as having CM during a prospective follow-up of nevi (group 4) or when consulting a dermatologist for other diseases (group 5).

Main Outcome Measures: Characteristics of patients, tumors, and patients’ residence in each group, including the geographical concentration of dermatologists. We performed multivariate analysis of these factors to determine association with Breslow thickness.

Results: Age, tumor location, Breslow thickness, ulceration, histological type, and geographical concentration of dermatologists significantly differed among groups. Patients consulting dermatologists directly formed the largest group (45.1%). Those referred by general practitioners (26.1%) were the oldest and had the highest frequency of thick (>3 mm), nodular, and/or ulcerated CM. Patients from groups 4 (8.4%) and 5 (14.1%) had the thinnest CMs. Ulcerated and/or thick tumors were absent in group 4. In multivariate analysis, histological types superficial spreading melanoma and lentigo maligna melanoma, younger age, high concentration of dermatologists, and detection by dermatologists were significantly associated with thinner CMs.

Conclusion: Easy access of patients to dermatologists, information campaigns targeting elderly people, and education of general practitioners are complementary approaches to improving early detection.

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Cutaneous melanoma (CM) is an increasing public health problem worldwide in white populations. In France, the incidence rate increased by factors of 3.16 for male and 2.25 for female patients from 1980 through 2005. Although this rising incidence mainly concerns thin CM, it is also accompanied by an increased mortality due to aggressive CM, especially in the male population. Unlike most other cancers, CM is a visible tumor, potentially detectable by the patients themselves or by their physicians during a simple cutaneous examination. However, many patients with CM are still diagnosed as having potentially life-threatening tumors with a high Breslow thickness. Factors associated with early vs late diagnosis remain poorly understood. Among these factors, health care patterns and circumstances of diagnosis may play a major role. In a previous population-based study, we collected information on incident cases of invasive CM diagnosed in residents of the 5 regions of northeastern France, focusing on daily clinical practice and variations in management after diagnosis. In the present complementary study, we have further analyzed the circumstances of diagnosis of these CM cases to identify different groups of CM and/or patients associated with different characteristics and prognosis. Our secondary ob-

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jective was to describe the role of the circumstances of diagnosis and access to dermatological care in the early detection of CM before the implementation in France of the coordinated care itinerary, by law 2004-810 of August 13, 2004. This law reformed health insurance and implemented a new form of access to health care by encouraging patients to first consult their referent general practitioner (GP) before any specialist. Direct access to dermatologists is not forbidden but is now dissuaded, leading to lower reimbursement rates. Because this law has been progressively enforced since 2005, the present study provides a baseline description of CM diagnosis and access to dermatological care in France before this reform.

The study was approved by the French National Commission Informatique et Liberté and by scientific committees of the Fondateur de France and the French Dermatologic Society. Incident cases of invasive CM diagnosed in 2004 in 5 regions of France (Alsace, Bourgogne [Burgundy], Champagne-Ardenne, Franche-Comté, and Lorraine) were identified using surveys of dermatologists, cancer registries, and pathology laboratories, as previously described.6 The study area covered 19.2% of the French territory and included a population of 8.2 million inhabitants, which was 13.5% of the French population in 2004.7 For each case, data were collected through questionnaires mailed to referring physicians, most of whom were private or hospital dermatologists. Physicians could request the assistance of a clinical research assistant, by telephone or on site.

DEMOGRAPHIC AND GEOGRAPHICAL DATA

We collected patient data concerning age; sex; area of residence (urban vs rural, according to the National Institute for Statistics and Economic Studies); distance from the patient’s residence to a reference dermatological center, as defined by the presence of a multidisciplinary cutaneous tumor board; and the concentration (density) of dermatologists in the patients’ area of residence, calculated by 100 000 inhabitants (demographic density) and by 1000 km² (geographical density). Densities were computed in each of the French administrative départements of the study area. Départements were secondarily grouped into very-low-, low-, intermediate-, and high-density départements using demographic densities (data not shown) and geographical densities (Figure), categorized by quartiles.

CLINICAL AND HISTOPATHOLOGICAL CHARACTERISTICS

The clinical and histopathological characteristics of the tumor that were collected included topography on covered sites (trunk and upper and lower limbs) vs uncovered/easily visible areas (head and neck), Breslow thickness, ulceration, and histological subtypes. Subtypes included superficial spreading melanoma (SSM), nodular melanoma (NM), lentigo maligna melanoma (LMM), acral lentigious melanoma (ALM), and other or unclassified subtypes.

CIRCUMSTANCES OF DIAGNOSIS

The circumstances of diagnosis were collected and divided into the following 5 groups: patients referred to private or hospital dermatologists by GPs for their tumor (group 1); patients referred to dermatologists for their tumor by other specialists, including surgeons (group 2); patients directly consulting a dermatologist on their own initiative for their tumor (group 3); patients diagnosed as having CM by a dermatologist during prospective follow-up of their nevi (including a minority of patients followed up after a previous cutaneous malignant neoplasm) (group 4); and patients diagnosed as having CM when consulting a dermatologist for another disease (incidental diagnosis) (group 5).

STATISTICAL ANALYSIS

Descriptive statistics were computed in the 5 diagnostic groups. Maps of density were drawn using the Gmap procedure of the SAS system.6 We used χ² tests to compare proportions. Analyses of variance or the nonparametric Kruskal-Wallis test was used for comparisons of continuous variables. Breslow thickness was categorized as 1 mm or less (thin), more than 1 mm to 3 mm (intermediate), and more than 3 mm (thick).

We then investigated the relationship between Breslow thickness and other variables by means of a stepwise multivariate linear model.7 Because the statistical distribution of Breslow thickness was highly right-skewed, a logarithmic transformation of its values was used to improve normality before analysis, as previously described.8 The significant threshold level was P ≤ .05. Statistical analyses were performed using the R⁹ and SAS⁸ packages.

RESULTS

Questionnaires were collected for 730 CM cases (83.0% of the total number of incident cases of invasive CM in the study area, as estimated from the cancer registries and pathology laboratories).3 Information regarding the circumstances of diagnosis was not available for 78 cases, which were consequently excluded from further analysis.

In the remaining 652 cases (74.1% of the estimated number of incident cases), complete information about
The median and mean Breslow thickness were 0.75 and 1.58 mm, respectively. Most patients (60.0%) had thin (ie, ≤1 mm) CM, whereas 11.8% had thick (ie, >3 mm) CM. Most CMs (86.5%) were located on covered areas. The most frequent histological subtype was SSM (72.0%), followed by NM (14.9%), LM (4.0%), ALM (3.9%), and other/unclassified (5.2%). Ulceration was present in 13.5% of CMs.

The breakdown according to circumstances of diagnosis revealed that the largest group consisted of patients who consulted a dermatologist directly on their own initiative for their tumor (group 3; 294 patients [45.1%]). The second and third largest groups, respectively, were patients referred by GPs to a dermatologist for a CM (group 1; 170 patients [26.1%]) and patients diagnosed as having CM when consulting a dermatologist for another disease (group 5; 92 patients [14.1%]). Only 8.4% of patients were diagnosed as having CM during a prospective follow-up of their nevi by a dermatologist (group 4; 55 patients). Patients referred to dermatologists by other specialists (including surgeons) were rare (group 2; 41 patients [6.3%]).

Major statistical differences were observed among these 5 groups (Table). These differences concerned age (P < .001), Breslow thickness (P < .001), anatomic topography (P = .03), histological subtype (P = .001), ulceration (P = .01), and the geographical density of dermatologists in the patients' area of residence (P = .009). Patients in group 1 were the oldest (mean, 62.7 years), with 40.0% of them being older than 70 years, compared with 24.3% of the other groups combined.

**Table. Characteristics of 652 Patients Diagnosed as Having CM in Northeastern France in 2004 by Circumstances of Diagnosis**

<table>
<thead>
<tr>
<th>Circumstances of Diagnosis, No. (%)</th>
<th>All Patients</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>652 (100.0)</td>
<td>170 (26.1)</td>
<td>41 (6.3)</td>
<td>294 (45.1)</td>
<td>55 (8.4)</td>
<td>92 (14.1)</td>
<td></td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>58.3 (16.9)</td>
<td>62.7 (16.5)</td>
<td>57.2 (17.8)</td>
<td>56.6 (16.7)</td>
<td>48.4 (14.1)</td>
<td>61.6 (15.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>306 (46.9)</td>
<td>86 (50.6)</td>
<td>21 (51.2)</td>
<td>127 (43.2)</td>
<td>27 (49.1)</td>
<td>45 (48.9)</td>
<td>.54</td>
</tr>
<tr>
<td>Female</td>
<td>346 (53.1)</td>
<td>84 (49.4)</td>
<td>20 (48.8)</td>
<td>167 (56.8)</td>
<td>28 (50.9)</td>
<td>47 (51.1)</td>
<td></td>
</tr>
<tr>
<td>Anatomite site</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covered area</td>
<td>562 (86.5)</td>
<td>137 (80.6)</td>
<td>32 (80.0)</td>
<td>261 (88.8)</td>
<td>52 (94.5)</td>
<td>80 (87.9)</td>
<td>.03</td>
</tr>
<tr>
<td>Uncovered area</td>
<td>88 (13.5)</td>
<td>33 (19.4)</td>
<td>8 (20.0)</td>
<td>33 (11.2)</td>
<td>3 (5.5)</td>
<td>11 (12.1)</td>
<td></td>
</tr>
<tr>
<td>Histological type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSM</td>
<td>445 (72.0)</td>
<td>101 (63.5)</td>
<td>27 (67.5)</td>
<td>200 (71.4)</td>
<td>48 (90.6)</td>
<td>69 (80.2)</td>
<td></td>
</tr>
<tr>
<td>NM</td>
<td>92 (14.9)</td>
<td>32 (20.1)</td>
<td>5 (12.5)</td>
<td>44 (15.7)</td>
<td>2 (3.8)</td>
<td>9 (10.5)</td>
<td>.001</td>
</tr>
<tr>
<td>ALM</td>
<td>24 (3.9)</td>
<td>9 (5.7)</td>
<td>2 (5.0)</td>
<td>11 (3.9)</td>
<td>0</td>
<td>2 (2.3)</td>
<td></td>
</tr>
<tr>
<td>LM</td>
<td>25 (4.0)</td>
<td>13 (8.2)</td>
<td>0</td>
<td>10 (3.6)</td>
<td>0</td>
<td>2 (2.3)</td>
<td></td>
</tr>
<tr>
<td>Not classified</td>
<td>32 (5.2)</td>
<td>4 (2.5)</td>
<td>6 (15.0)</td>
<td>15 (5.4)</td>
<td>3 (5.7)</td>
<td>4 (4.7)</td>
<td></td>
</tr>
<tr>
<td>Tumor thickness, mm</td>
<td>1.58</td>
<td>2.38</td>
<td>1.40</td>
<td>1.51</td>
<td>0.69</td>
<td>0.95</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean</td>
<td>0.75</td>
<td>1.12</td>
<td>0.96</td>
<td>0.80</td>
<td>0.60</td>
<td>0.55</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Median</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breslow tumor thickness, mm</td>
<td>≤1</td>
<td>371 (60.0)</td>
<td>79 (48.8)</td>
<td>19 (54.3)</td>
<td>162 (57.9)</td>
<td>45 (83.3)</td>
<td>66 (75.9)</td>
</tr>
<tr>
<td></td>
<td>&gt;1-3</td>
<td>174 (28.2)</td>
<td>54 (33.3)</td>
<td>13 (37.1)</td>
<td>83 (29.6)</td>
<td>9 (16.7)</td>
<td>15 (17.2)</td>
</tr>
<tr>
<td></td>
<td>&gt;3</td>
<td>73 (11.8)</td>
<td>29 (17.9)</td>
<td>3 (8.6)</td>
<td>35 (12.5)</td>
<td>0</td>
<td>6 (6.9)</td>
</tr>
<tr>
<td>Ulceration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>517 (86.5)</td>
<td>125 (80.6)</td>
<td>30 (83.3)</td>
<td>235 (86.7)</td>
<td>49 (100.0)</td>
<td>78 (89.7)</td>
<td>.01</td>
</tr>
<tr>
<td>Yes</td>
<td>81 (13.5)</td>
<td>30 (19.4)</td>
<td>6 (16.7)</td>
<td>36 (13.3)</td>
<td>0</td>
<td>9 (10.3)</td>
<td></td>
</tr>
<tr>
<td>Density of dermatologists</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low/low</td>
<td>150 (23.0)</td>
<td>46 (27.1)</td>
<td>7 (17.1)</td>
<td>73 (24.8)</td>
<td>7 (12.7)</td>
<td>17 (18.5)</td>
<td>.009</td>
</tr>
<tr>
<td>Intermediate</td>
<td>189 (29.0)</td>
<td>34 (20.0)</td>
<td>11 (26.8)</td>
<td>94 (32.0)</td>
<td>14 (25.5)</td>
<td>36 (39.1)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>313 (48.0)</td>
<td>90 (52.9)</td>
<td>23 (56.1)</td>
<td>127 (43.2)</td>
<td>34 (61.8)</td>
<td>39 (42.4)</td>
<td></td>
</tr>
<tr>
<td>Rurality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.75</td>
</tr>
<tr>
<td>Rural</td>
<td>253 (39.5)</td>
<td>71 (43.0)</td>
<td>16 (40.0)</td>
<td>109 (37.6)</td>
<td>19 (35.2)</td>
<td>38 (41.8)</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>387 (60.5)</td>
<td>94 (57.0)</td>
<td>24 (60.0)</td>
<td>181 (62.4)</td>
<td>35 (64.8)</td>
<td>53 (58.2)</td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations:** ALM, acral lentiginous melanoma; CM, cutaneous melanoma; LM, lentigo maligna melanoma; NM, nodular melanoma; SSM, superficial spreading melanoma.

a Because of rounding, percentages may not total 100%. Groups are described in the “Circumstances of Diagnosis” subsection of the “Methods” section.

b Recorded in 651 cases (99.8%).
c Recorded in 650 cases (99.7%).
d Recorded in 618 cases (94.8%).
e Recorded in 598 cases (91.7%).
f Indicates the geographical density of dermatologists in the French département of the patient’s residence.
g Recorded in 640 cases (98.2%).
(P < .001). They also had the highest frequency of NM (20.1%) and of ulcerated CM (19.4%). The mean Breslow thickness (2.38 mm) was maximal in this group. Cutaneous melanomas thicker than 3 mm accounted for 17.9% of the CMs in this group compared with 9.6% of the 4 other groups combined (P < .01).

In contrast, patients whose CM was first diagnosed by a dermatologist (groups 4 and 5) had the lowest Breslow thickness (mean, 0.69 and 0.95 mm, respectively, and median, 0.60 and 0.55 mm, respectively). Patients diagnosed with CM when being prospectively followed for their nevi (group 4) were the youngest (mean age, 48.4 years), with only 5.5% being older than 70 years. They were characterized by very thin CMs (mean thickness, 0.69 mm; median, 0.60 mm; and ≤1 mm, 83.3%) and by the absence of thick and/or ulcerated CMs. Cutaneous melanomas in group 4 were also characterized by their location on covered areas (94.5%) and by the frequency of SSM (90.6%) and the rarity of NM (3.8%).

Patients diagnosed as having CM when consulting a dermatologist for another disease (group 5) were close in age to those of group 1 (mean age, 61.6 years and patients >70 years old, 33.7%). In contrast, Breslow thickness was much lower in this group (mean thickness, 0.95 mm and median, 0.55 mm), similar to that observed in group 4. However, the values were more dispersed than in group 4, with a small proportion of thick CMs (6.9%).

Patients who consulted a dermatologist directly for a CM (group 3) formed the largest group. They had an intermediate age (mean, 56.6 years) and had tumors of intermediate thickness (mean thickness, 1.51 mm and median, 0.80 mm). In contrast to group 4, 15.7% of these patients had an NM and 13.3% had ulcerated tumors.

Finally, few patients were referred to dermatologists for CM by other specialists (group 2). These patients were similar to group 3 in age (mean age, 57.2 years) and frequency of NM (12.5%) and thick CMs (8.6%). As with patients referred by GPs (group 1), they had a high frequency of ulcerated CM (16.7%) and of CM located on uncovered areas (20.0%).

Overall, 39.7% of the 73 patients with thick CMs were referred to dermatologists by GPs, whereas only 8.2% were diagnosed incidentally when consulting a dermatologist for miscellaneous diseases and none during prospective follow-up of nevi. In contrast, 29.9% of patients with thin CMs were diagnosed incidentally by dermatologists (17.8%) or during prospective follow-up of their nevi (12.1%), and only 21.3% were referred by GPs. In both groups (thick and thin CMs), a high proportion of patients (47.9% and 43.7%, respectively) consulted a dermatologist directly for their CM and few patients (4.1% and 5.1%, respectively) were referred by other specialists.

Nodular melanomas were rarely detected by dermatologists (12.0%) and frequently referred by GPs (34.8%). In contrast, 26.3% of SSMS were detected by dermatologists and 22.7% were referred by GPs. In both groups (NM and SSM), a high proportion of patients (47.8% and 44.9%, respectively) consulted a dermatologist directly for their CM.

Concerning geographical settings, no difference was observed between diagnosis groups for the proportion of patients living in urban vs rural areas (Table), for the distance from their residence to a reference center, and for the demographic density of dermatologists around their residence (data not shown). However, the geographical density of dermatologists around the patients’ residence significantly differed between groups. Concentrations of dermatologists varied widely according to département (Figure). A high proportion of patients prospectively followed up for their nevi (61.8% compared with 46.7% of the other groups combined, P = .04) were living in départements with a high geographical density of dermatologists.

Stepwise multivariate linear analysis showed that the following 5 variables were associated with a lower Breslow thickness: relative of ulceration (P < .001), the histological types SSM and LM rather than NM and ALM (P < .001), a younger age (P < .001), a high geographical density of dermatologists in the patients’ area of residence (P < .001), and detection by a dermatologist (groups 4 and 5; P < .01). Sex, distance to a reference dermatological center, rurality, topography of CM, and demographic density of dermatologists had no effect on Breslow thickness in this model.

Numerous studies have focused on the conditions and patterns of CM diagnosis, with the aim of better understanding factors associated with late-stage, potentially fatal CM.10-16 However, to our knowledge, few studies performed to date have been based on population.11-16 In France, only 1 hospital-based study has been published to date.17,18

In the present study, we collected information about geographical, demographic, clinical, and histopathological characteristics of invasive CM diagnosed in 2004 in a geographical area covering 19.2% of the French territory and the circumstances of the diagnoses. Complete information was available in 652 cases, or 74.1% of the estimated number of incident cases diagnosed in the study area. These cases were divided into 5 groups according to their circumstances of diagnosis and access to dermatological care. We found important differences among these groups for patients’ age, location of CM, Breslow thickness, ulceration, histological subtype, and geographical density of dermatologists in the patients’ area of residence.

The largest group was represented by patients who consulted a dermatologist directly for their own CM (group 3; 45.1%). Although this study relied only on a survey of physicians and did not include interviews of patients, it is probable that most of these patients had identified their lesion as abnormal and/or suspect. It is also probable that some group 1 patients had detected their own lesions before consulting a GP. This possibility points out the prominent role of patients in CM detection. In accordance with our results, several studies evaluated the rate of self-detected CM at about 50%,11-17 making education of patients a crucial tool for improving early di-

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agnosis. An Italian study in 816 patients with CM showed that the habit of performing skin self-examination was associated with earlier diagnosis. Various approaches have been proposed for educating patients, including training in CM recognition using photographs and educational brochures, with generally favorable results. Beside campaigns favoring general public awareness, such approaches could be developed in high-risk populations.

In addition to the prominent role of self-detection by patients, the high number of group 3 patients also points out direct access to dermatologists as a major mode of CM diagnosis and management until 2004 in France. This is in accordance with a recent French survey that found that direct access to dermatologists was the dominant pattern for management of skin diseases as a whole. Soon thereafter, the French state health care insurance modified the procedure for the reimbursement of health care expenses, and patients consulting a dermatologist directly now suffer a financial penalty. In view of the high number of group 3 patients in the present study, this reform will probably lead to significant modifications in the patterns of access to health care of patients with CM. Whether it could modify Breslow thickness and overall prognosis will require further studies, including comparison with the present one.

The second largest group (group 1; 26.1%) consisted of patients whose CM was first suspected or diagnosed by GPs and who were secondarily referred to dermatologists. This group was characterized by a high proportion of elderly patients; of thick, ulcerated, and/or nodular CM; and of CM located on the head and neck. These characteristics may result from factors related to patients or their tumors and to physicians. Older patients, those with multiple associated health failures, those with rapidly growing CM, or those with tumors occasioning symptoms such as bleeding or pain may be more likely to consult their primary health care provider. Patients may also be more likely to consult a GP for atypical, often more aggressive lesions not self-identified as CM, in particular ALM and NM, which accounted for 25.8% of CM cases in group 1 vs 16.3% of the other groups combined (P = .002). Finally, patients lacking knowledge of CM and/or concern for skin care are unlikely to consult a dermatologist first. These factors related to patients and their tumors may partly explain the high proportion of thick CMs in group 1. However, factors related to GPs should also be considered. Several studies underlined the insufficient training of GPs in CM diagnosis. In addition, many barriers exist to GPs' inspection of skin, such as involvement in a large list of prevention-oriented activities and limited time available per patient, which may explain the lower rate of CM diagnosed on covered areas by GPs than in other groups of the present study. Conversely, different studies pointed out the potential role of trained and sensitized GPs in early diagnosis of CM. In a recent study conducted among GPs and occupational physicians in France, we found that medical education sessions using numerous photographs of pigmented lesions had a rapid and large impact in terms of sensitization to skin examinations and a moderate but significant effect on accuracy of diagnosis. In view of these data and the results of the present study, training campaigns for GPs should be encouraged.

In contrast to group 1, patients whose CM was detected by a dermatologist (groups 4 and 5) had the lowest Breslow thickness. In particular, patients prospectively followed up for their nevi (group 4) had very thin CMs and never had ulcerated and/or thick (ie, >3 mm) tumors. However, these patients accounted for less than 10% of the whole study population and were obviously selected patients. Although they had a well-balanced sex repartition that did not differ from that of the other groups, they were on average more than 10 years younger and were living in areas with higher concentrations of dermatologists. In addition, prospective follow-up of pigmented lesions by dermatologists does not appear in the present study as a means of detecting every kind of CM. Nodular, acral lentiginous, ulcerated, and/or thick CM and CM on uncovered areas were rarely or never detected in this group. Indeed, prospective follow-up by dermatologists typically led to the detection of thin SSM on covered areas in young patients. It remains uncertain whether a larger detection of such (often slowly growing) CM by systematic dermatological screening of at-risk informed patients could still significantly reduce CM-related mortality in France and other Western countries. In contrast, recent studies suggested that rapidly growing, life-threatening CMs often occur in elderly male patients with few melanocytic nevi and freckles and no clear history of excessive sun exposure. In view of our results and current guidelines for CM screening, such patients are unlikely to be regularly followed up by dermatologists. However, their rapid access to diagnosis through GPs and/or dermatologists seems crucial for reducing residual CM-related mortality in Western countries.

In multivariate linear analysis, we found that patients' residence in an area with a high geographical density of dermatologists and detection by a dermatologist (groups 4 and 5) were significantly associated with a lower Breslow thickness, in addition to other more classic factors, including younger age, histological subtypes SSM and LM, and the absence of ulceration. This extends previous results observed in Italian and North American populations. In particular, a population-based study in the United States found that detection by dermatologists compared with nondermatologists was associated with earlier-stage CM and improved survival. These data are of particular interest in the present climate of health care reform, in France and worldwide, characterized by attempts to redefine the repartition of provision of care between primary care physicians and dermatologists. Concerning the repartition of dermatologists, we found that the geographical density of dermatologists, but not the demographic density, was significantly associated with Breslow thickness. This is in accordance with a recent study that found that the geographical distance to diagnosing health care providers had a more important effect on Breslow thickness than the demographic density of dermatologists. This suggests that distance, reluctance to move, and the cost of transportation may be more limiting factors for patients' access to care than delays.
and waiting time to consultations. This could be particularly the case among elderly patients, who have the highest incidence of thick CM.

Our analysis of different patterns of diagnosis of CM in France suggests several complementary ways to improve the outcome of CM through early detection. Because self-detection by patients is the dominant mode of diagnosis but leads to a significant proportion of thick tumors, campaigns aiming to increase public awareness of CM should be reinforced. Prospective follow-up of high-risk patients by dermatologists is highly effective in preventing thick tumors but is still responsible to date for only a small proportion of CM detection in France and could therefore be extended to wider target populations. Incidental detection by dermatologists appears to be a frequent mode of diagnosis, pointing out the strong concern of dermatologists for CM and the usefulness of complete skin examinations in patients consulting for miscellaneous diseases. Because the geographical density of dermatologists in patients' area of residence and detection by a dermatologist were associated with thinner CMs, health care systems allowing easy access to dermatologists should be promoted. Finally, primary care physicians play an important role in CM diagnosis, particularly in elderly patients, but frequently refer patients with thick CMs to dermatologists. Their training in complete skin examinations and the diagnosis of skin tumors, in close cooperation with dermatologists, should be encouraged. Further studies are warranted to better characterize and recognize patients with atypical and/or fast-growing CM.

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