NODULAR MELANOMA (NM), the second most common subtype of melanoma, accounts for 15% to 30% of all melanomas and approximately 40% to 50% of melanomas thicker than 2 mm.\(^1\)\(^,\)\(^2\) Nodular melanoma has been shown to possess a more rapid growth rate,\(^3\) more biologically aggressive behavior,\(^4\) and an increased number of mitoses\(^5\) compared with other melanoma subtypes. Unlike the other melanoma subtypes, NM appears to lack an initial radial growth phase and rather begins with vertical growth, a factor possibly attributable to the nature of the tumor cells and/or various microenvironmental influences. Recent studies with reflectance-mode confocal microscopy suggest that NM does not demonstrate the epidermal features of disarrangement and pagetoid infiltration seen in superficial spreading melanomas.\(^6\)\(^\) It has been proposed that dissimilarities in melanoma subtypes may result because they originate from different stem cell types; that is, NM arises from dermal stem cells, whereas the other subtypes arise from epidermal stem cells.\(^7\) Differences in the genetic alterations found in each of the melanoma subtypes may also account for some of the variability in presentation and development.\(^8\)

Nodular melanoma is more commonly seen in men older than 50 years, with most lesions found on the head and neck.\(^1\) The lesions are frequently symmetric, elevated, small in diameter, and amelanotic and have a single color.\(^9\)\(^,\)\(^10\) In addition, they have been associated with a smaller total number of nevi than superficial spreading melanomas.\(^2\) The ABCD criteria used in the evaluation of potential melanoma assess lesions for asymmetry, border irregularity, color variegation, and diameter greater than 6 mm.\(^11\) With NM significantly demonstrating symmetry, regular borders, uniform colors, and small diameters, the ABCD criteria may overlook early melanomas of this subtype, limiting their applicability.\(^9\)\(^,\)\(^10\) For this reason, the EFG rule for the identification of NM has been introduced, summarizing the most frequent clinical features of NM (elevation, firm on palpation, and continuous growth for 1 month).\(^12\) The frequency of changes in NM lesions observed by patients, such as changes in elevation\(^9\)
and bleeding,9 highlight the importance of careful follow-up and examination of evolving lesions.

Although NM represents only a small fraction of melanoma with a thickness of less than 1.3 mm, a better understanding of the characteristics of such thin NMs may help elucidate new means of detecting NM at an earlier stage. Thinner NMs have been shown to be smaller in diameter than both superficial spreading melanoma of similar thickness10 and thick NMs,9 a feature that may complicate early identification. The purpose of this study was to review a series of thin NM cases to identify historical, clinical, and dermoscopic factors that may facilitate earlier diagnosis of NM, thereby helping to reduce its associated morbidity and mortality.

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**REPORT OF CASES**

We herein report a series of 11 cases of NMs that were less than 1.3 mm thick and obtained from 4 centers worldwide. Only lesions meeting histologic criteria for NM, that is, those demonstrating exclusively vertical invasion with lateral extension limited to less than 3 rete ridges,13 were included. These histologic characteristics of NM are illustrated in Figure 1, in an image obtained from case 2. Although centralized pathology review was not performed, all of the dermatopathologists reviewing their respective cases used the aforementioned definition to classify each lesion as NM. Information about the cases was obtained through retrospective analysis of the patients’ medical records, including clinical and dermoscopic images, which are shown in Figure 2 and Figure 3. Information sought from the patients’ medical records included demographic factors, melanoma risk factors, and details about the presentation of the lesion, including who discovered it, what signs and symptoms were noted, what prompted the visit to the dermatologist (with particular attention to how long the patient waited to make an appointment and how long the patient waited for the scheduled appointment), and the location of the lesion.

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**Figure 1.** Histologic image of the lesion from case 2 demonstrating the microscopic features of nodular melanoma. Growth is entirely vertical, with lateral spread limited to less than 3 rete ridges.

**Figure 2.** Clinical images of thin nodular melanoma lesions. A, Shiny red oval papule with regular borders (case 1). B, Homogeneous blue lesion resembling a blue nevus (case 2). C, Irregular red papule suspected of being malignant (case 3). D, A 4-mm lesion with the clinical appearance of a banal nevus (case 4). E, Shiny irregular papule that was suspected of being malignant (case 5). F, Irregularly shaped red papule (case 6). G, A round pink lesion with overlying hyperkeratosis (case 7). H, Brown-black papule with regular borders (case 8). I, Shiny gray-brown papule with regular borders (case 9). J, Irregularly shaped darkly pigmented lesion (case 10). K, Eccentric blotch of brown to black pigmentation on a background tan and pink plaque (case 11). The scales in E and J show millimeters.
Clinical features of the lesions were assessed using criteria derived from the ABCD criteria,14 the EFG rule,12 and the 3 Cs of melanoma (color, contour, and change).15 Specifically, characteristics such as maximum diameter, shape, symmetry, color, borders, elevation, shininess, and the presence of ulceration were evaluated through clinical images of the lesions. Dermoscopic images of the lesions were also analyzed for overall pattern, organization, symmetry, and color,16 as well as for dermoscopic structures often found in melanoma such as atypical pigment networks, radial streaming/streaks, shiny white streaks (chrysalis), atypical dots and globules, irregular blotches, structureless areas, a blue-white veil, and atypical vascular structures.17,18 The dermoscopic images were obtained using polarized (PD) or nonpolarized (NPD) dermoscopy, both of which allow for the visualization of subsurface skin structures, with the difference being that NPD necessitates direct contact with the skin and a liquid interface that are not required with PD. Differences exist between the 2 dermoscopic modalities. Milialike cysts, comedolike openings, and regression structures such as peppering and blue-white veil are better visualized with NPD, whereas blood vessels and chrysalis are more prominent with PD.19 The historical, clinical, and dermoscopic findings for each case are summarized in Tables 1, 2, and 3, respectively.

CASE 1

A 57-year-old woman with a history of basal cell carcinoma (BCC) and metastatic melanoma to the lung and jejunum who had been free of disease for 6 years underwent a routine medical examination. A 3.0-mm elevated, shiny, oval lesion was identified on the right side of her chest (Figure 2A). Clinically, it was symmetric in 2 axes, not ulcerated, and red, with regular borders. When analyzed with NPD (Figure 3A), the lesion had a featureless pattern and contained 3 different colors (light brown, gray-blue, and red). Atypical dots, a blue-white veil over a raised area, brown structureless areas, and atypical vessels were seen dermoscopically. Based on pathologic analysis, the lesion was believed to represent a new primary lesion rather than a cutaneous metastasis.

CASE 2

A 51-year-old man with no history of skin cancer underwent evaluation of a lesion on his nose. On total body skin examination, a 7.0-mm elevated, round lesion was...
identified on the left arm (Figure 2B). Clinically, it was blue and symmetric in 2 axes and had regular borders. When analyzed with NPD (Figure 3B), the lesion had a homogeneous disorganized pattern and was asymmetric in 2 axes. Two different colors (dark brown and gray-blue) were seen in the lesion. A blue-white veil over a raised area and brown structureless areas were seen in the dermoscopic analysis of the lesion.

CASE 3

A 46-year-old woman with no history of skin cancer presented for evaluation of a lesion on her left arm that had grown and bled a few times in the preceding 6 months. Clinically, an 8.0-mm elevated, irregularly shaped lesion was identified on her left upper arm (Figure 2C). The lesion had irregular borders, and was asymmetric in 2 axes. Three different colors (red, black, and gray) were seen on clinical examination, with red being the predominant color. When analyzed with NPD (Figure 3C), the lesion had a featureless pattern and contained 3 different colors (dark brown, gray-blue, and red). A blue-white veil over a raised area, atypical vessels, and a pink veil (also known as a “milky red” area) were also seen dermoscopically.

CASE 4

An 81-year-old woman with a history of BCC presented with a new pigmented lesion on her right arm (Figure 2D), just a few weeks after her last routine total body examination. Clinically, it was elevated and irregularly shaped with a diameter of 4.0 mm. The lesion had irregular borders, was symmetric in 1 axis, and contained 2 colors (brown and black), with black being the predominant color. Nonpolarized dermoscopy revealed a homogeneous disorganized pattern, asymmetry in 2 axes, and 3 different colors (dark brown, gray-blue, and red) (Figure 3D). A blue-white veil over a raised area, irregular blotches, structureless areas, and a pink veil were also seen dermoscopically.

CASE 5

A 29-year-old woman presented with a rapidly growing lesion on her right lower limb. A 4.0-mm shiny, irregularly shaped papule was seen clinically (Figure 2E). It had regular borders, was asymmetric in 2 axes, and contained 2 colors (brown and red), with red being the predominant color. Analysis with PD (Figure 3E) revealed a multicomponent disorganized pattern, asymmetry in

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Table 1. Historical Features

<table>
<thead>
<tr>
<th>Case No./Sex/Age at Presentation, y</th>
<th>Tumor Thickness, mm</th>
<th>Discovered Lesion</th>
<th>Physician Visit Prompt</th>
<th>Lesion Location</th>
<th>History of Clinically Atypical Nevi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/F/57</td>
<td>0.85</td>
<td>Physician Routine</td>
<td>Chest</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2/M/51</td>
<td>0.80</td>
<td>Patient Different lesion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Upper extremity</td>
<td>No</td>
<td></td>
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<tr>
<td>3/F/46</td>
<td>1.10</td>
<td>Patient Change in existing lesion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Upper extremity</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>4/F/81</td>
<td>0.60</td>
<td>Patient New lesion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Upper extremity</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>5/F/29</td>
<td>1.20</td>
<td>Patient Changing lesion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Lower extremity</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>6/M/66</td>
<td>1.00</td>
<td>Physician Routine</td>
<td>Back</td>
<td>No</td>
<td></td>
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<tr>
<td>7/F/69</td>
<td>1.10</td>
<td>Physician Routine</td>
<td>Upper extremity</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>8/M/35</td>
<td>0.65</td>
<td>Physician Routine</td>
<td>Left temple</td>
<td>Yes</td>
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<tr>
<td>9/F/21</td>
<td>0.45</td>
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<td>Upper extremity</td>
<td>No</td>
<td></td>
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<tr>
<td>10/F/60</td>
<td>1.20</td>
<td>Patient New evolving lesion&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Upper extremity</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>11/F/54</td>
<td>0.60</td>
<td>Physician Incidental finding during unrelated visit</td>
<td>Upper extremity</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Indicates immediate rather than routine visit.

Table 2. Clinical Features<sup>a</sup>

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Maximum Diameter, mm</th>
<th>Shape</th>
<th>Symmetry</th>
<th>Predominant Color</th>
<th>Total No. of Colors in Lesion</th>
<th>Borders</th>
<th>Shininess</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3.0</td>
<td>Oval</td>
<td>Symmetric in 2 axes</td>
<td>Red</td>
<td>1 Regular</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>7.0</td>
<td>Round</td>
<td>Symmetric in 2 axes</td>
<td>Blue</td>
<td>1 Regular</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>8.0</td>
<td>Irregular</td>
<td>Asymmetric in 2 axes</td>
<td>Red</td>
<td>3 Irregular</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>4.0</td>
<td>Irregular</td>
<td>Symmetric in 1 axis</td>
<td>Black</td>
<td>2 Irregular</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>10.0</td>
<td>Irregular</td>
<td>Asymmetric in 2 axes</td>
<td>Red</td>
<td>2 Regular</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>6.5</td>
<td>Round</td>
<td>Symmetric in 2 axes</td>
<td>Pink</td>
<td>2 Regular</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>3.5</td>
<td>Oval</td>
<td>Symmetric in 2 axes</td>
<td>Brown-black</td>
<td>1 Regular</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>9</td>
<td>2.0</td>
<td>Round</td>
<td>Symmetric in 2 axes</td>
<td>Gray-brown</td>
<td>2 Irregular</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>10</td>
<td>4.0</td>
<td>Irregular</td>
<td>Symmetric in 2 axes</td>
<td>Brown-black</td>
<td>3 Irregular</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>11</td>
<td>4.0</td>
<td>Oval</td>
<td>Asymmetric in 2 axes</td>
<td>Brown</td>
<td>3 Irregular</td>
<td></td>
<td>–</td>
</tr>
</tbody>
</table>

<sup>a</sup>Elevation was present in all cases. Ulceration was absent in all cases.

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Abbreviations: −, absent; +, present.

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A 35-year-old man underwent a routine annual dermatologic examination owing to his multiple risk factors for melanoma, including a history of melanoma (a superficial spreading melanoma with a Breslow thickness of 0.5 mm had been excised from his back 2 years previously), a large number of nevi (approximately 150), including 18 clinically dysplastic nevi, and a significant sunburn history with evidence of solar damage. During this examination, an increase in depth of pigmentation and size was noted in a lesion on his left temple compared with baseline photographs (Figure 2H). It was symmetric in 2 axes, contained uniform brown-black pigmentation, was not ulcerated, and had regular borders. Nonpolarized dermoscopy revealed a 3.5-mm ovoid lesion containing multiple globules that were black, blue-gray, dark brown, and light brown (Figure 3H). The lesion had a globular, disorganized pattern; was symmetric in 2 axes; and had areas of blue-white veil.

A 21-year-old woman presented initially to her primary care physician concerned about a known nevus on her arm that appeared to be increasing in size and changing in color. The need for an examination seemed more urgent when the lesion suddenly became raised. Results of the dermoscopic examination by her physician were interpreted as a traumatized nevus; however, owing to the degree of patient concern, she was referred to a dermatologist. The new lesion was shiny, raised, and 2.0 mm in diameter (Figure 2I). It was gray-brown and symmetric in 2 axes and had irregular borders. Nonpolarized dermoscopy revealed the lesion to have a homogeneous, disorganized pattern (Figure 3I). It was asymmetric in 1 axis and contained 3 different colors (gray, blue, and brown) and peripheral brown and gray dots.

A 60-year-old woman presented to her dermatologist because she was concerned about a new pigmented lesion on her forearm. This patient performed regular skin self-examinations prompted by a history of 2 melanomas and 10 BCCs, and she intermittently visited a dermatologist. She had a few nevi, none of which were clinically dysplastic. Clinical examination of the new lesion revealed a 4.0-mm raised, darkly pigmented lesion with irregular borders that was symmetric in 2 axes (Figure 2J). Under NPD (Figure 3J), 5 colors were appreciated (red, black,
blue-gray, dark brown, and light brown). There was evidence of a homogeneous, disorganized pigment pattern with atypical brown dots and globules, asymmetry in 2 axes, and a blue-white veil over a raised area.

CASE 11

A 54-year-old woman was referred to a dermatologist by her primary care physician after noting a pigmented lesion on her arm during an examination for an unrelated matter. The patient reported enjoying the sun and using tanning salons occasionally. She had a family history of nonmelanoma skin cancer but no personal history of skin cancer. A full skin examination revealed abundant freckles, lentigines, and seborrheic keratoses. There were 40 nevi, with only the 1 suspicious lesion showing clinical evidence of atypia (Figure 2K). Clinically, the suspect lesion was 4.0 mm in diameter, oval, and minimally elevated and contained 3 colors with an eccentric blotch of brown to black pigmentation on a background tan and pink plaque. There was asymmetry in 2 axes. Nonpolarized dermoscopy of the lesion revealed a globular-homogeneous, disorganized pattern (Figure 3K). It contained 5 colors (red, light brown, brown, blue-gray, and black) with a gray-black blotch, aggregated brown and black dots and globules, and a blue-white veil.

COMMENT

Melanoma is the sixth most common malignant neoplasm in the United States. It is estimated that 62,480 people were diagnosed as having melanoma and 8,420 people died of the disease in 2008. The rising incidence of melanoma in the United States has been attributed to an increased incidence of thin and thick melanomas. The increase in thick lesions was not a result of disproportionate increases in NM. A recent study of the Lawrence Livermore National Laboratory screening and education program demonstrated decreases in the incidence of and mortality due to thick melanoma as a result of the program. This demonstrates that discovering lesions while they are still thin can lead to a subsequent reduction in the incidence of the thicker lesions, which have a poorer prognosis, and highlights the importance of secondary prevention. The importance of melanoma screening is also shown by the finding that geographic areas with more dermatologists are associated with earlier diagnoses of melanoma than are geographic regions in which fewer dermatologists practice. A better understanding of the features of thin NMs is important for its earlier detection and improved awareness of its clinical behavior, especially because NMs represent a large fraction of thin melanomas with poorer prognoses. In the present study, we attempted to characterize only thin, easily curable NMs with thickness of less than 1.3 mm that met the strict histopathologic definition of NM. We found that thin NMs had a subtle clinical appearance and often lacked the ABCD criteria, a finding consistent with those of previous studies. Some have proposed using the 3 Cs criteria and the EFG rule in lieu of the ABCD criteria because sole reliance on the latter may miss some melanomas. Clinically, 7 (64%) of the thin NM lesions we examined were symmetric, 5 (45%) had regular borders, 4 (36%) were of a uniform color, and 7 (64%) had a maximum diameter of less than 6.0 mm. Thus, sole reliance on the ABCD criteria for the diagnosis of NM would likely allow many cases of NM similar to those we analyzed to escape detection. Because changes in appearance occur more quickly in NM compared with other melanoma subtypes, it is critical that patients and physicians not dismiss the possibility of NM in new or changing lesions that do not fit the ABCD criteria. Delays in diagnosis may lead to rapid lesion growth. This potential for rapid growth is evidenced by case patients 4 and 6, who in 3 and 6 months, respectively, after their last total body examinations developed NMs with Breslow thicknesses of 0.60 and 1.00 mm, respectively. The small diameter of NM lesions observed by us and others presents another potential cause for delayed diagnosis, highlighting that lesions should not be dismissed because of size alone. In addition, the lesions in our study demonstrate that NMs clinically may mimic benign lesions such as fibromas (case 1) or dermal nevi (cases 2, 3, and 6). Because NMs can take on such a benign clinical appearance, it is important that further dermoscopic analysis be used to help rule out malignancy.

Clinically atypical nevi have been associated with an increased risk of melanoma. In our study, only 2 of the 11 patients had a history of clinically atypical nevi or many moles, contributing to the fact that the thin NM lesions did not typically present in a clinically suspicious manner. Lower nevus counts in patients with NM have also been reported elsewhere, emphasizing that patients with NM frequently lack the prototypic phenotypic appearance of a patient at high risk for melanoma. This is further illustrated by the variable skin cancer history of the patients in this case series, with some having a history of multiple primary melanomas, some having a history of nonmelanoma skin cancer, and some having no history of skin cancer. It is therefore important that new lesions that are clinically or historically remarkable be properly evaluated because some may prove to be malignant.

Most of the thin NM lesions we analyzed dermoscopically had an overall homogeneous or featureless pattern, and most were found to be disorganized and asymmetric. Dermoscopic features often seen in other melanoma subtypes, such as atypical and negative pigment networks, radial streaming/streaks, pseudopods, irregular blotches, atypical dots, and globules, were lacking in most of the lesions examined. A blue-white veil and structureless areas, however, were present in most of the lesions, as were abnormal vascular structures such as atypical hairpin, dotted, serpentine, and polymorphic vessels and a pink veil (milky red area). A chrysalis was seen only in the images analyzed with PD but, because a chrysalis is not discernable in NPD images, further analysis is required to determine whether this is a dermoscopic feature of most early NMs. One of the lesions (case 5) showed a pseudolagoons pattern with some vessels present inside the lagoons, a criterion that has been described in NMs mimicking hemangiomas. Thus, although many key dermoscopic features of melanoma are absent in these thin NMs, select elements such as a ho-
mogeneous disorganized pattern, asymmetry, a blue-white veil, structureless areas, and atypical vascular structures are commonly present and should increase suspicion in examining physicians. Because the dermoscopic characteristics of these thin NMs appear more suggestive of malignancy than do the clinical features, pursuing clinically new or changing lesions with dermoscopic analysis may aid in their more timely detection. For physicians unfamiliar with dermoscopic examination, excision of suspect raised lesions rather than observation is recommended owing to the rapid growth rate of NMs.

Our group and others have shown that NM is typically discovered by patients themselves. Because the rapid growth rate of NMs may allow a lesion arising between routine physician screenings to increase in thickness by the time of detection, it is critical to educate patients about skin self-examinations. However, because 5 of the 11 lesions we analyzed were discovered incidentally by physicians, it is important to also emphasize physician education. Patients must also have rapid access to dermatologists to evaluate suspicious lesions, and a recent study demonstrating significantly shorter wait times for patients requesting appointments for cosmetic botulinum toxin injections compared with those requesting appointments for changing moles raises concerns about the ability of patients with thin lesions of the rapidly growing NM subtype to obtain timely consultation. The importance of prompt patient evaluation is highlighted by case patient 4, who called for and obtained an appointment to see a dermatologist within a week of detecting the lesion, allowing for timely management of the already 0.6-mm-thick lesion.

Our study was subject to a number of limitations, one being the small size of the study population. Although we contacted numerous melanoma referral centers worldwide to obtain clinical and dermoscopic images of NMs less than 1.3 mm thick, we found only 11 cases (from 4 different centers), highlighting the rarity of finding NM lesions at this early stage. As previously mentioned, the fact that some dermoscopic images were obtained with NPD whereas others were obtained with PD prevents us from making more general observations about the presence of dermoscopic features such as chrysalis. Finally, because historical data about the patients was sought through their medical records, we could not ask the patients any specific questions; thus, the scope of information available was limited to that provided at the time of their visit.

It is important for physicians and patients to acknowledge the often unrewarding clinical presentation of NM and to be wary of any new or changing lesions. Adding the 3 Cs criteria and the EFG rule of melanoma to the ABCD criteria can help detect lesions that may have been missed with the ABCD criteria alone, with changes in color, elevation, growth in diameter, and bleeding warranting further investigation. In addition, de novo lesions should be further pursued irrespective of size because a small diameter can be seen in NM. Dermoscopy may help increase detection of early NMs, with dermoscopic features typically more suggestive of malignancy than clinical ones. It is therefore important that this tool be taught to and used by physicians to analyze suspicious lesions. Secondary prevention efforts may help to heighten awareness among patients, who are frequently the initial discoverers of the NM lesions. Combined efforts by patients and physicians can help to ensure decreased wait times for obtaining medical consultation in patients with potential NM. We hope that such efforts will help to decrease the thickness of NM at first presentation and alleviate some of its morbidity and mortality.

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Author Contributions: Ms Kalkhoran and Dr Marghoob had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Kelly and Marghoob. Acquisition of data: Milne, Zalaudek, Puig, Malvehy, Kelly, and Marghoob. Analysis and interpretation of data: Kalkhoran, Kelly, and Marghoob. Drafting of the manuscript: Kalkhoran and Milne. Critical revision of the manuscript for important intellectual content: Zalaudek, Puig, Malvehy, Kelly, and Marghoob. Obtained funding: Marghoob. Administrative, technical, and material support: Kalkhoran and Marghoob. Study supervision: Kelly and Marghoob.

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REFERENCES


Notable Notes

Trends in Dermatology: Melanoma Incidence

The incidence of invasive melanoma in the United States continues to rise 4% to 6% annually despite all of our efforts to improve primary prevention. Similar increases are being noted worldwide. It was estimated that 68 720 Americans will have been diagnosed as having melanoma in 2009, and the current lifetime risk for developing invasive melanoma is 1 in 30. Also, it was estimated that 8650 Americans died of melanoma in 2009.

This increase in melanoma incidence is not due to artifact and cannot be attributable to better counting methods (many cancers are decreasing) or to changes in histologic diagnosis (longitudinal studies have shown no temporal change). Actual rates are probably higher than reported because most tumors are treated in the outpatient setting (missing tumor registries lead to undercounting) and melanoma is not a reportable disease in most states. Incidence is projected to continue to increase at similar rates for the foreseeable future.

Darrell S. Rigel, MD

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