Surveillance of Patients for Early Detection of Melanoma

Patterns in Dermatologist vs Patient Discovery

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Objective: To determine which groups of patients are most and least likely to detect their own melanomas independent of dermatologist evaluation.

Design: Retrospective analysis.


Patients: One hundred sixty-seven consecutive patients with incident biopsy-confirmed melanomas.

Main Outcome Measures: Proportion of melanomas found on dermatologist examination vs those brought to the attention of the examining dermatologist by the patient. Secondary analysis examined associations between who detected the melanoma (dermatologist vs patient) and patient age, personal history of skin cancer, family history of melanoma, and depth of lesion.

Results: Of the 167 melanomas, 101 (60.5%) were brought to the attention of the dermatologist by the patient. Detection by a dermatologist was significantly associated with patient age of 50 years or older ($P = .002$), personal skin cancer history ($P < .001$), and a lesion depth of less than 0.75 mm at the time of detection ($P = .03$). Only 3.0% of all melanomas in this study were detected by dermatologists in patients who had a low baseline risk of melanoma (age < 50 years, no personal history of skin cancer, and no family history of melanoma). These patients were much more likely to detect their own melanoma (odds ratio, 7.32 [95% confidence interval, 2.69-19.90]).

Conclusions: Screening for melanoma in asymptomatic patients younger than 50 years with no medical history of skin cancer or family history of melanoma yields few physician-detected melanomas because these patients are most likely to detect their melanomas themselves. Screening and surveillance efforts should focus on patients 50 years or older and those with a personal history of skin cancer or a family history of melanoma.

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The incidence of melanoma has steadily increased worldwide for the past 50 years. In the United States, the American Cancer Society estimates that there were 68,720 new diagnoses of melanoma in 2009, placing melanoma as the fifth and sixth most commonly diagnosed cancer for men and women, respectively. Melanoma incidence increases with age, and melanoma-specific mortality is increasing in patients older than 65 years.

Melanoma outcome is strongly determined by tumor thickness at the time of diagnosis. As such, there is considerable interest in improving melanoma outcomes through regular examination of patients by dermatologists, which is assumed to detect early, thinner melanomas. However, specific screening and surveillance recommendations vary widely. Melanoma screening is based on the assumptions that (1) trained dermatologists will find melanomas that would otherwise go unnoticed or would be detected at a later stage by patients, and (2) this will result in decreased melanoma-related morbidity, mortality, and cost.

The question of who—patient or physician—is most likely to detect melanoma first has been addressed in other studies, with most finding that approximately half of all primary cutaneous melanomas are initially detected by the patient. However, determining which group of patients is least likely to self-detect melanoma, or to detect melanoma...
only at a later stage, would be useful in making more pragmatic decisions regarding the benefits of skin cancer screening and surveillance recommendations. To address this question, we conducted a retrospective analysis of biopsy-confirmed melanomas. Patient medical records were reviewed to determine whether the lesion was brought to the attention of the dermatologist by the patient before the examination or was found by the dermatologist on routine skin cancer examination. Other pertinent information, including lesion Breslow depth, patient age, sex, personal history of skin cancer, and family history of melanoma, was also collected and correlated with detection pattern to determine which patient populations are most and least likely to benefit from skin cancer screening.

### METHODS

#### STUDY SUBJECTS

A retrospective analysis was performed on biopsy-confirmed melanomas diagnosed through the Department of Dermatology at the University of Pittsburgh Medical Center, from January 1, 2003, through December 31, 2008. Approval for medical record review was obtained from the University of Pittsburgh institutional review board. A total of 242 melanomas in 203 patients were found on initial inquiry; 36 records lacked sufficient data to determine whether the melanoma was part of the patient’s presenting concern. Reasons for insufficient data included the unavailability of the medical record or documentation of the visit only as a procedure for lesion removal and for which history and physical examination data were not available. If a patient had more than 1 primary melanoma diagnosed during the study period, only the first melanoma diagnosed in our institution was included in the analysis (39 melanomas diagnosed during the study period were excluded on the basis of this criterion). Analysis was performed on the remaining 167 incident melanomas. Lesions not specifically addressed by the patient at the beginning of the visit, as documented in the history of present illness, were considered to be dermatologist detected. Other information obtained from the patient medical record included age at diagnosis, sex, patient-reported family history of melanoma, personal history of any skin cancer (based on patient report and available medical records), and Breslow depth of the melanoma.

### STATISTICAL ANALYSIS

Demographic and lesion characteristics were stratified by detection (dermatologist vs patient) and by Breslow depth ($\geq 0.75$ vs $<0.75$ mm). Univariate comparisons were made using the unpaired 2-tailed $t$ test for continuous variables and the $\chi^2$ test for categorical variables. When appropriate, we used the Fisher exact test. Because Breslow depth was not normally distributed in our population, we used the Mann-Whitney test to make comparisons. Multivariable logistic regression was performed with dermatologist detection as the outcome. Statistical significance was set at $P<.05$, and all analyses were performed using commercially available software (SPSS Statistics, version 17.0; SPSS, Inc, Chicago, Illinois).

### RESULTS

#### PATIENT AND LESION CHARACTERISTICS

Patient demographics and lesion characteristics are presented in Table 1. Median patient age was 52 (range, 17-87) years. More than half the lesions (55.1%) were from patients 50 years or older. Most of the melanomas (59.3%) were from male patients. The mean and median Breslow depths of melanomas in this study were 0.51 and 0.22 mm, respectively (range, 0 [in situ] to 18.00 mm). Lesions were less than 0.75 mm deep in 85.0% and less than 1 mm deep in 88.0%. In all, 16.2% of patients reported a medical history of melanoma; 30.5%, a history of any skin cancer; and 15.0%, a family history of melanoma.

#### MELANOMA DETECTION PATTERNS

Overall, 60.5% of all melanomas were part of the patient’s presenting history (patient detected), and 39.5% were detected by the examining dermatologist and were not suspected by the patient of being cancerous (dermatologist detected). Patient characteristics by each method of detection are shown graphically by age group that is further broken down into patient history (history of any skin cancer and/or family history of melanoma) (Figure). The proportion of dermatologist-detected lesions increased with increasing patient age.

### Table 1. Descriptive Statistics of 167 Consecutive Patients With Malignant Melanoma

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>Median (range)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>52.0 (17.7)</td>
</tr>
<tr>
<td>Tumor thickness, mm</td>
<td>Mean (SD)$\dagger$</td>
</tr>
<tr>
<td>Median (range)</td>
<td>0.51 (1.50)</td>
</tr>
<tr>
<td>Age, y $&lt;$30</td>
<td>Median (range) $\dagger$</td>
</tr>
<tr>
<td>30-49</td>
<td>542 (32.3)</td>
</tr>
<tr>
<td>50-64</td>
<td>47 (28.1)</td>
</tr>
<tr>
<td>$\geq 65$</td>
<td>45 (26.9)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>68 (40.7)</td>
</tr>
<tr>
<td>Male</td>
<td>99 (59.3)</td>
</tr>
<tr>
<td>Breslow tumor thickness, mm</td>
<td></td>
</tr>
<tr>
<td>$&lt;0.75$</td>
<td>142 (85.0)</td>
</tr>
<tr>
<td>$\geq 0.75$</td>
<td>25 (15.0)</td>
</tr>
<tr>
<td>$&lt;1.00$</td>
<td>147 (88.0)</td>
</tr>
<tr>
<td>$\geq 1.00$</td>
<td>20 (12.0)</td>
</tr>
<tr>
<td>Personal history of any skin cancer (n=165)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>51 (30.5)</td>
</tr>
<tr>
<td>No</td>
<td>114 (68.3)</td>
</tr>
<tr>
<td>Personal history of malignant melanoma (n=164)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27 (16.2)</td>
</tr>
<tr>
<td>No</td>
<td>137 (82.0)</td>
</tr>
<tr>
<td>Family history of malignant melanoma (n=156)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25 (15.0)</td>
</tr>
<tr>
<td>No</td>
<td>131 (78.4)</td>
</tr>
</tbody>
</table>

$\dagger$ Unless otherwise indicated, data are expressed as number (percentage) of patients. Percentages have been rounded and may not total 100.

$\dagger$ Includes malignant melanoma in situ.
Demographic and lesion characteristics by detector of the melanoma are shown in Table 2 and Table 3. Dermatologist detection of melanoma was associated with being 50 years or older (odds ratio [OR], 2.75 [95% confidence interval (CI), 1.43-5.29]), a personal history of melanoma (4.70 [1.91-11.50]), and most strongly with a personal history of any skin cancer (6.72 [3.23-14.00]) (Table 3). Separate analysis was also performed excluding melanoma in situ, and dermatologist detection of invasive melanoma was found to be associated with being 50 years or older (OR, 3.71 [95% CI, 1.29-7.81]), a personal history of melanoma (5.54 [1.36-22.62]), and personal history of any skin cancer (6.44 [2.04-20.32]).

Given the higher melanoma incidence and mortality rates in older men, this group was analyzed independently. Men 50 years or older were more likely to have their melanoma detected by a dermatologist (OR, 2.80 [95% CI, 1.47-5.36]), but analysis by sex showed that male sex was only marginally associated with dermatologist detection (1.67 [0.88-3.19]), suggesting that being 50 years or older, rather than the patient’s sex, is more significantly associated with dermatologist detection. However, when melanoma in situ was excluded, male sex was more significantly associated with dermatologist detection of invasive melanoma (OR, 2.40 [95% CI, 0.98-5.90]).

We also describe the detection pattern of melanoma in low-risk individuals using 2 definitions of the low-risk patient. In our first model (low risk 1), we defined the low-risk patient as younger than 50 years without a reported or documented personal history of any skin cancer or a family history of melanoma. These patients were much more likely than other patients to detect their melanoma themselves (OR for patient detection, 7.49 [95% CI, 2.69-19.90]; in fact, only 5 of all 167 melanomas (3.0%) were detected by dermatologist examination in this low-risk population. The average (SD) depth of the self-detected melanomas in this group was 0.46 (0.58) mm. When the low-risk group was defined only as being younger than 50 years with no personal history of any skin cancer (low risk 2), this group was still more likely to detect their own melanomas (OR for patient detection, 4.15 [95% CI, 1.97-8.73]), constituting 12 of all 167 melanomas (7.2%) in our study. Similar results were seen when melanoma in situ was excluded (ORs [95% CIs] for patient detection of invasive melanoma, 5.75 [1.56-21.28] in the low-risk 1 group and 2.99 [1.10-7.52] in the low-risk 2 group).

Overall, dermatologist-detected melanomas were thinner than patient-detected melanomas, although in this study the difference was not statistically significant (patient-detected median depth, 0.26 mm; dermatologist-detected median depth, 0.21 mm [P = .12]). Excluding melanoma in situ, patient-detected melanomas were significantly thicker (median depth, 0.60 mm; dermatologist-detected median depth, 0.43 mm [P = .04]). Melanoma in situ was equally as likely to be detected by the patient as by the dermatologist (OR, 0.79 [95% CI, 0.42-1.47]), but deeper melanomas were more likely to be patient detected (ORs [95% CIs] for patient detection of lesions ≥0.75 mm, 3.01 [1.07-8.48], and for patient detection of lesions ≥1 mm, 4.25 [1.19-15.10]).

We also calculated mean melanoma depth for all categorical variables in Table 3 to determine whether any patient group was more likely to self-detect melanoma at a greater Breslow depth. No significant mean differences between patient- and dermatologist-detected melanomas were found (data not shown), although this study was not powered to detect subtle differences in depth at diagnosis. However, as shown in Table 3, patient detection of deeper (≥0.75 mm) melanomas was more common only among patients 50 years or older (17.4% patient detected vs 4.3% dermatologist detected [P = .04]).

Finally, we created a multivariable logistic regression model to determine which variables were most associated with dermatologist detection of melanomas in our population, including all variables that were significantly associated with dermatologist detection univariately. After adjusting for sex and Breslow depth, being 50 years or older (OR, 2.69 [95% CI, 1.18-6.16]), personal history of skin cancer (5.69 [2.53-12.80]), and family history of melanoma (3.70 [1.29-10.60]) were all independently associated with dermatologist detection (Table 4).
We found that, although dermatologists detected 39.5% of the melanomas in our study, only 3.0% of these melanomas were detected by screening asymptomatic, low-risk patients (defined as age < 50 years, no personal history of skin cancer, and no family history of melanoma). This was not owing to a low prevalence of melanoma in this group, because approximately 25% of the melanomas in this study were from patients who meet these criteria. By contrast, 50% of melanomas in patients 50 years or older were dermatologist detected, and self-detected melanomas in patients 50 years or older were more likely than dermatologist-detected melanomas to have a Breslow depth of 0.75 mm or greater.

Other studies have examined the association between patient and physician detection of melanoma, with physician detection accounting for 14% to 56.3% of lesions.4-9 Kantor and Kantor6 found that more than half of all melanomas in their private practice were dermatologist detected and that dermatologist detection was associated with thinner melanomas. In Australia, one study10 showed that, when compared with patients diagnosed as having thicker primary melanomas, patients with thinner melanomas (< 0.75 mm) were more likely to have had a skin cancer screening examination within the 3 years before the diagnosis, suggesting a role for screening in early detection.

Our data suggest that melanoma screening and surveillance are most useful in patients 50 years or older and in patients with a personal skin cancer history and/or a family history of melanoma. Screening for melanoma among higher-risk patients has been shown to be cost-effective.11 Screening the general asymptomatic population at 50 years of age for melanoma has also been found to be as cost-effective as breast and colon cancer screening.12 However, individuals seeking skin cancer screening are often younger, as evidenced in a report13 on the American Academy of Dermatology skin cancer screening program that showed that 41.6% of those screened during a 15-year period were 50 years or younger. In our own practice, we found that approximately 20% of all patients who present for skin cancer screening lacked a lesion of concern and would meet the criteria of being at very low risk.14

The value of melanoma screening has been questioned and recommendations vary widely. For example, the US Preventive Services Task Force15 states there is not sufficient evidence to recommend for or against skin cancer screening, whereas the American Cancer Society16 recommends skin cancer screening as part of periodic health assessments in adults. One study found that most dermatologists are unaware of any formal melanoma screening recommendations.17 Although the total body skin examination poses little risk to individual patients, indiscriminant screening of all interested patients despite a lack of melanoma risk factors is not the most efficient strategy. Cancer screening has the highest yield of cancers detected per individuals screened when the screening is targeted toward higher-risk patients. This same premise has been used for age- and risk factor–specific guidelines18 for other cancer screening procedures, including mammography, colonoscopy, quantification of serum prostate-specific antigen levels, and Papanicolaou smears. Melanoma screening is unique in that the skin is almost entirely visible to the patient; thus,
self-detection of cutaneous melanoma is possible at an early stage. Consideration of which patients are least likely to detect their own melanoma is important when formulating melanoma screening guidelines.

As has been seen in other cancers, increased melanoma surveillance will inevitably lead to biopsy—and likely to more aggressive treatment—of lesions that may appear to be of histological concern but that have indolent clinical behavior. Specifically, it is not clear if all melanomas in situ represent precursors to invasive melanoma or that all early invasive melanomas have the potential to metastasize. The ramifications of this are significant, for the individual patient who will now carry a diagnosis of a potentially fatal malignant neoplasm and for the cost that will be incurred in the treatment of potentially nonaggressive lesions. It is for this reason that we advocate more precise guidelines that will better identify which patients should be followed up by a dermatologist for early melanoma detection. However, we are still left with the problem that we cannot predict which lesions could have been left undetected without harm to the patient, and histopathologic examination remains the gold standard for the diagnosis of melanoma.

This study has several limitations, and certainly clinical judgment should play a role in determining which patients should be screened regularly for melanoma. For example, we did not take into account the history of dysplastic nevi or total nevus count, both of which can increase one’s lifetime risk of melanoma. Also, because we were primarily interested in determining the value of surveillance by dermatologists, we did not distinguish between patients who found their own melanoma and those who presented after their melanoma was found by a spouse, friend, or primary care physician. Subsequent studies should address this issue because more than half the melanomas in our study (and in other studies) were detected outside the dermatology office. This is particularly important in understanding the role that primary care providers may play in melanoma detection as incidence increases. In addition, because we looked at patients followed up and diagnosed in a dermatology practice, melanoma risk factors were more prevalent and patients were followed up more regularly with skin examinations by dermatologists in our study population than in the general population. Because our practice is part of a large medical center, our patients might have been more likely than patients in other settings to be screened by other physicians and referred to our practice for further evaluation. Finally, this study is retrospective, and the ideal study design to ascertain the true benefit of screening is a prospective, randomized controlled trial. Such a study, however, would be cost-prohibitive and is not likely to be forthcoming.

Despite these limitations, our results aid in understanding which patients will benefit most from screening for melanoma by a dermatologist. In summary, our findings support screening of patients 50 years or older, patients with a personal history of skin cancer, and patients with a family history of melanoma, but clinical judgment should be used to determine which other patients would also benefit from regular screening. Further studies are also needed to determine the optimal frequency of screening. In this single-institution study, lower-risk patients seem to detect their own melanomas effectively at a thin stage; thus, public health efforts to educate this group on the importance of seeking timely dermatologic consultation for suspicious lesions may have a higher yield (greater effect) than large-scale screenings. Larger multicenter studies are needed to confirm our findings. In light of the average wait times of 38 days for an appointment to evaluate a changing mole, improved access to prompt evaluation of suspicious lesions is also an important part of melanoma secondary prevention.

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Author Contributions: Dr Ferris had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: McGuire, Andrulonis, and Ferris. Acquisition of data: McGuire and Andrulonis. Analysis and interpretation of data: McGuire, Secrest, Andrulonis, and Ferris. Drafting of the manuscript: McGuire and Ferris. Critical revision of the manuscript for important intellectual content: McGuire, Secrest, Andrulonis, and Ferris. Statistical analysis: Secrest. Administrative, technical, and material support: Andrulonis and Ferris. Study supervision: Ferris.

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**The Best of the Best**

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De Berker and Lawrence present an innovative, minimally traumatic, surgical treatment of digital myxoid cysts (DMCs). Traditionally, these benign lesions, also considered ganglions of the distal interphalangeal joint (DIPJ), have been treated by puncture and drainage, cryosurgery, and surgical excision, all with varying cure rates.

In an open, nonrandomized trial of therapy, the authors evaluated a novel technique that allowed them to visualize the connection (in 90% of cases) between the DMC and the DIPJ during the procedure by injecting methylene blue dye into the DIPJ. The visible connection was destroyed with suture ligation or electrocautery, and the cyst contents were evacuated without any skin being excised. Fifty-four cysts were treated, of which 47 were on the fingers and 7 were on the toes. At 8 months, 48 of 54 patients (89%) remained cured, although the outcomes varied depending on the location of the cyst; the cure rate on the fingers was 94% compared with 57% on the toes.

The authors elegantly describe and visually demonstrate a minimally traumatic surgical technique with good outcomes. Dermatologists can use this technique for the in-office treatment of DMCs.

From August 2009 through August 2010, this article was viewed 2155 times on the Archives of Dermatology Web site.

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