Management of Melanoma in a Patient Population: Using Electronic Health Records to Enhance Postdiagnosis Surveillance

Early detection of melanoma reduces morbidity and mortality, yet research to evaluate the effectiveness of total-body skin examinations (TBSEs) is lacking. Because a history of melanoma confers a greater risk for developing subsequent primary melanomas (SPMs),¹ the Dermatology Division of Kaiser Permanente Hawaii recommends at least annual TBSEs in these patients. Our study evaluated the benefit of using electronic health records (EHRs) to track patients with a history of melanoma to ensure annual TBSEs.

Methods. Individuals diagnosed as having an SPM between February 1, 2010, and February 28, 2011, were included using Kaiser Permanente’s KP HealthConnect EHR. Chart review was performed to determine if the SPM was diagnosed during a Kaiser Permanente–initiated annual screening TBSE or a patient-initiated encounter. Patient awareness of the lesion was also assessed. One sample t test was used to determine whether the SPM incidence in the Kaiser Permanente Hawaii population differed from the baseline melanoma incidence in Hawaii. Multiple regression analysis using stepwise backward elimination, age and gender were found not to predict Breslow thickness, but patient awareness of the lesion as predictors of Breslow thickness. Statistical analyses were performed using SAS software, version 9.1 (SAS Institute Inc).

Results. During our study period, 48 SPMs were diagnosed in 42 patients. The incidence of SPMs was significantly higher than the baseline melanoma incidence in Hawaii (P < .001).² Of the 48 SPMs, 40 (83%) were diagnosed in patients who were contacted for a timely annual TBSE and an additional 4 (8%) were diagnosed in patients who were contacted because they were overdue for this examination. None of these patients were aware of their melanomas (Figure, groups A and B). Four SPMs (8%) were diagnosed in patients who were not due for TBSEs but who detected a worrisome lesion on themselves (Figure, group C).

The time lapse between the SPM and the most recent prior melanoma ranged from 3 months to 31 years (mean, 4.4 years) (Table). The mean Breslow thickness of the invasive SPMs was 0.39 mm. Twenty-seven percent of SPMs were thicker than the most recent prior melanoma (13 of 48); 13% were the same thickness (6 of 48); 50% were thinner (24 of 48); and 10% had unknown prior melanoma thicknesses (5 of 48). Sixty-five percent of SPMs occurred on non–sun-exposed skin, presumably decreasing the ease of patient self-detection for these lesions.

With multivariate regression using stepwise backward elimination, age and gender were found not to predict Breslow thickness, but patient awareness of the lesion was a predictive factor. The melanomas detected by patients (group C, average Breslow thickness, 0.57 mm) were significantly thicker than those detected by the dermatologists during screening examinations (groups A and B, average Breslow thickness, 0.22 mm) (P < .01).

Comment. A history of melanoma confers an increased risk for SPMs, often occurring within a few months to 2 years after the primary melanoma is identified. However, some studies have shown significantly longer intervals between the initial and second primaries.³ The long interval found in our study lends support to the concept of lifelong annual follow-up.

Screening TBSEs performed by physicians during the SCREEN study⁴ resulted in an increase in melanoma incidence, proving TBSEs to be an effective screening tool. Broebl et al⁵ found that 93% of SPMs were dermatologist

![Figure](https://example.com/figure.png)

**Figure.** Second primary melanomas diagnosed during 13-month study period. PT indicates patient. *Kaiser Permanente–initiated appointment for screening total-body skin examination.

![Table](https://example.com/table.png)

<table>
<thead>
<tr>
<th>Lesion Group</th>
<th>Breslow Thickness of Original Primary Melanoma, Mean, mm</th>
<th>Time Lapse Between Melanomas, Mean, y</th>
<th>Breslow Thickness, Mean, mm</th>
<th>SPMs Thicker Than Most Recent Prior Melanoma, No. (%)</th>
<th>SPMs on Non-Sun-Exposed Skin, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (n = 40)</td>
<td>0.48 (+ 10 MIS) (+ 4d)</td>
<td>3.7</td>
<td>0.35 (+ 17 MIS)</td>
<td>9 (23)</td>
<td>25 (63)</td>
</tr>
<tr>
<td>B (n = 4)</td>
<td>1.85 (+ 3 MIS)</td>
<td>4.6</td>
<td>0.43</td>
<td>3 (75)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>C (n = 4)</td>
<td>1.01 (+ 1f)</td>
<td>10.1</td>
<td>0.57</td>
<td>1 (25)</td>
<td>2 (50)</td>
</tr>
<tr>
<td>Total</td>
<td>0.56 (+ 13 MIS) (+ 5d)</td>
<td>4.4</td>
<td>0.39 (+ 17 MIS)</td>
<td>13 (27)</td>
<td>31 (65)</td>
</tr>
</tbody>
</table>

*Abbreviations: MIS, melanoma in situ (for which no Breslow thickness is available); TBSE, total-body skin examination; SPM, subsequent primary melanoma.

a Patient not overdue for TBSE; patient unaware of lesion.

b Patient overdue for TBSE; patient unaware of lesion.

c Patient not overdue for TBSE; patient aware of lesion.

d Number of melanomas other than MIS with unknown Breslow thickness.
detected, which correlates with the 90% rate in our study. Given the high number of SPMs diagnosed in our patient population over 13 months, at least annual TBSEs for patients with a history of melanoma seems advisable.

Breslow thicknesses of SPMs detected through screening examinations are usually thinner than the initial melanomas, but a substantial minority (up to 30%) are thicker. Similarly, in our study, 50% of SPMs were thinner, while 27% were thicker than the most recent prior melanomas. This suggests that routine TBSEs lead to earlier detection of melanomas, thinner Breslow measurements, and therefore improved overall patient survival.

This study evaluated the effect of screening TBSEs on short-term disease detection rates in a high-risk population but did not address long-term effects on patient outcomes or cost-effectiveness. Incidence of SPM in this study is likely increased due to enhanced screening efforts. The utility of screening TBSEs in a low-risk patient population was not addressed. Furthermore, Kaiser Permanente patients may be more amenable to regular preventive health screenings. For dermatology practices without an EHR, a manual spreadsheet of patients with melanoma could be created to track annual follow-up visits.

In conclusion, this study lends further support to the hypothesis that annual TBSEs for patients with a history of melanoma leads to the detection of asymptomatic disease. Using an EHR to identify high-risk patients who are due or overdue for annual TBSEs leads to earlier detection of second primary melanomas and increases patient survival.

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Accepted for Publication: August 21, 2012.  
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Author Contributions: Dr Reisenauer had full access to all of 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: Reisenauer. Acquisition of data: Reisenauer, Lee, Akamine, Tabacchini, and Golden. Analysis and interpretation of data: Reisenauer, Lee, Akamine, and Golden. Drafting of the manuscript: Lee, Akamine, Tabacchini, and Golden. Critical revision of the manuscript for important intellectual content: Reisenauer, Lee, Akamine, and Golden. Statistical analysis: Lee. Administrative, technical, and material support: Lee and Tabacchini. Study supervision: Reisenauer.

Conflict of Interest Disclosures: None reported.


COMMENTS AND OPINIONS

Smoking, a Dangerous Habit for the Skin

We are all acutely aware of the causal association of UV radiation exposure and skin cancers, and we warn our patients about the hazards of sun exposure. In the August issue of this journal, Leonardi-Bee et al1 published an important systematic review and meta-analysis on the effects of smoking on the risk of nonmelanoma skin cancer. Their study clearly demonstrated that smoking increases the risk of cutaneous squamous cell carcinoma, although it does not appear to modify the risk of basal cell carcinoma. Verkouteren and Nijsten,2 in commentary published in the same issue, shed light on the practical implications of the findings and explain how they translate into clinical practice. The authors of this comment justifiably urge us to take advantage of this association and “collaborate with smoking cessation programs as an element of good patient care,”2 suggesting that “physicians could make use of the current cancer experience in motivating patients to discontinue smoking, which has many additional important health benefits.”2

I would like to raise another point that I believe will be even more alarming to the smoking public, who, in spite of our efforts to promote our antismoking campaign, appear not to be deterred by the threats of cancer and death. As dermatologists, we are “lucky” to possess what may be even more convincing reasons and motivations for supporting the antismoking campaign. We propose that, for many smokers, particularly the young ones, the evidence that smoking is associated with irreversible aesthetic damage (ie, premature aging and wrinkling of the skin and discoloring of the teeth3) and deleterious effects on male sexual potency4 will be much more compelling than the proof that smoking can cause skin cancer and kill. One glance at the figures of how much is spent on fillers for wrinkles and teeth-whitening procedures is enough to reveal what the public really cares about. As such, we dermatologists are armed with extremely potent ammunition in the war against smoking, and we should use it to the fullest. Articles such as the analysis of Leonardi-Bee et al5 and the comments of Verkouteren and Nijsten2 are a most welcome addition to our armamentarium.

Ronni Wolf, MD

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