

# Surgical Management of Primary Cutaneous Melanomas of the Hands and Feet

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## Objective

The purpose of the study was to investigate the surgical management of cutaneous melanomas of the hands and feet.

## Summary Background Data

Prior studies suggest that patients with melanomas >1-mm thick should be treated with excision with a 2-cm margin and undergo elective lymphadenectomy in selected circumstances. These recommendations are based primarily on data from melanomas of the trunk and extremities. Melanomas of the hands and feet are less common and less well studied. They pose a surgical challenge because primary wound closure often is difficult, and the incidence and management of regional node metastases are unclear.

## Methods

Charts of patients with melanomas of the hands or feet treated at the Massachusetts General Hospital between 1980 and 1994 were reviewed retrospectively. Local recurrence rates and the incidence of regional node metastases were analyzed as a function of histology, margin of excision, and microscopic thickness of the melanoma.

## Results

Data from 116 patients (39 men, 77 women) with melanomas of the hands ( $n = 26$ ) and feet ( $n = 90$ ) were evaluated. Pathologic diagnoses were: acral lentiginous melanoma (48 patients); subungual melanoma (13 patients), and skin of dorsum of the hand or foot ( $n = 55$ ). Digital amputation was required in all 13 patients with subungual melanoma to maintain local control; still, nodal metastases developed in 46% of patients within 1 year. Seventy-one percent of patients with acral lentiginous melanoma presented with lesions  $\geq 1.5$  mm, and nodes or systemic disease or both developed in 56% of patients. Acral lentiginous melanoma lesions <1.5-mm thick were treated principally by excision with a 1-cm margin; a local recurrence or metastases did not develop in any of the patients. None of the patients with melanomas on the dorsum of the hand or foot <1.5-mm thick had a local recurrence, but regional or systemic disease developed in >50%. Local control in patients with lesions >1.5-mm thick frequently required skin grafting or amputation. The majority of patients with melanomas  $\geq 1.5$  mm in thickness undergoing elective lymph node dissection had histologically positive nodes for melanoma.

## Conclusions

Melanomas of the hands and feet <1.5-mm thick have a low incidence of nodal metastases and are treated effectively with wide excision of the primary with a 1-cm margin. Thicker melanomas are associated with a >50% rate of regional or systemic failure. In the absence of metastatic disease, these individuals should undergo local excision with a 2-cm margin and intraoperative lymphatic mapping followed by lymphadenectomy if the sentinel node is positive.

The incidence of melanomas of the hands and feet varies considerably from country to country. In the United States, lesions of these sites comprise <5% of all cutaneous melanomas.<sup>1</sup> The functional requirements of these body parts, together with the difficulty of obtaining conventionally recommended margins, make treatment of melanomas in these locations particularly challenging for the surgeon. Because of the tendency to use smaller margins in treating lesions of the hands and feet (in an attempt to avoid amputation or skin grafting), local recurrence rates have been reported to be two to five times higher than those for melanomas at other sites.<sup>1</sup> The optimal surgical management of cutaneous melanomas continues to be debated, and the proper operative treatment of melanomas of the hands and feet, which have been studied in less detail than those of trunk and extremity melanomas, is no exception.

Current recommendations regarding the optimal surgical management of the primary melanoma site are based on randomized clinical trials that principally have evaluated patients with cutaneous melanomas of the trunk and extremities. These studies have led to the recommendation that thin melanomas (<1 mm in thickness by Breslow microstaging) be excised with a 1-cm margin, whereas a 2-cm margin is recommended for lesions between 1 and 4 mm in thickness.<sup>2</sup> These recommendations emphasize the trend over the years toward narrower margins of local excision for cutaneous melanomas, and it has been suggested that 2-cm margins may be excessive in many circumstances.<sup>3</sup>

Because the regional lymph nodes remain the most common site of melanoma metastases, the role of regional lymph node dissection also has been the subject of several clinical trials. Palpably enlarged lymph nodes in a regional lymph node basin is almost always an indication for therapeutic lymphadenectomy. Conversely, the indications for elective lymph node dissection (*i.e.*, removal of lymph nodes from a basin that is normal to palpation)

remain controversial. Although several retrospective clinical trials show a survival benefit for patients with intermediate thickness melanomas who undergo elective lymph node dissection compared to those who undergo delayed therapeutic lymph node dissection,<sup>4</sup> subsequent prospective, randomized,<sup>5</sup> and retrospective<sup>6</sup> trials did not confirm these results. A recent prospective, randomized, surgical trial of 740 patients with melanoma comparing the efficacy of elective (immediate) lymph node dissection *versus* clinical observation showed that immediate regional lymph node dissection offers a benefit to patients 60 years of age or younger with melanomas between 1 and 2 mm in thickness.<sup>7</sup> The improvements in 5-year survival were significant statistically (88% *vs.* 81% when stratified by age; 96% *vs.* 86% when stratified by depth). These improvements in survival are modest, and the major criticism of elective lymph node dissection is that a substantial number of patients undergo unnecessary surgery. This can now be avoided because of the recently developed technique of intraoperative sentinel lymph node mapping.<sup>8</sup>

Given the uncommon nature of melanomas of the hands and feet and the controversy regarding the optimal surgical management of melanomas in general, the aim of this retrospective study was to evaluate our experience with patients with lesions of the hands and feet.

## MATERIALS AND METHODS

Using the Hospital's Cancer Data Registry, 162 patients with primary cutaneous melanomas of the hands or feet evaluated at the Massachusetts General Hospital between 1975 and 1994 were identified. These patients' medical records were reviewed by a single investigator (JFT) for biographic information, location and pathologic subtype and depth of lesions, surgical management of local (including margins of resection) and regional disease, the incidence of metastatic disease, and length of follow-up. Patients were classified according to diagnosis by histologic subtype: acral lentiginous melanoma, subungual melanomas, or melanomas arising on the dorsum of the hand or foot (superficial spreading or nodular melanoma). Local recurrence rates and the incidence of metastases were analyzed as a function of type of melanoma, margin of excision, and microscopic thickness of the mel-

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anoma. Data were analyzed using a relational database (Filemaker Pro 2.0; Claris, Santa Clara, CA). Differences in recurrence rates and reconstruction procedures (skin grafting, amputation) were analyzed by chi square analysis.

## RESULTS

Forty-six patients were excluded from analysis either because of insufficient follow-up data or inadequate pathologic information in patients undergoing local excision at an outside hospital. One hundred sixteen patients underwent definitive surgical therapy and had sufficient data for analysis. Mean follow-up in these patients was 67 months. Thirty-nine patients were men, and 77 were female. Twenty-six patients had primary cutaneous melanomas of the hand, and 90 patients presented with foot lesions. The median age of these patients was 60, with a range from 15 to 83 years. Classification by race showed that the majority of patients were white (Fig. 1). Diagnoses included acral lentiginous melanoma (48 patients); subungual melanoma (13 patients); and cutaneous melanomas of the dorsum of the hand or foot (55 patients, 45 with superficial spreading, 10 with nodular melanomas).

Patients were divided arbitrarily into those with lesions <1.5 mm in thickness and those with melanomas  $\geq$ 1.5 mm in thickness as measured histologically with an ocular micrometer (Table 1). In those individuals with melanomas <1.5 mm in thickness, there were no local recurrences (Fig. 2A). Metastases subsequently developed in two patients (5%). Clinically positive regional nodes developed in one patient and was treated with a therapeutic lymph node dissection. Systemic disease developed in the other patient. Both patients died from metastatic disease. Only 3 of the 37 patients with lesions <1.5 mm had an elective lymph node dissection, and in all 3 patients, the nodes were negative histologically for melanoma (Fig. 3). These individuals remain free of disease at last follow-up. For acral lentiginous melanoma lesions < 1.5-mm thick, most patients could be treated by primary excision with a 1-cm margin, thus avoiding amputation or skin grafting. A local recurrence or metastases did not develop in any of the patients.

Patients with melanomas  $\geq$ 1.5 mm in thickness fared considerably worse. Of the 79 patients in this group, 15 (19%) presented with regional node disease (Fig. 4B,  $p < 0.05$  vs. patients with lesions <1.5-mm thick). Twenty-two others underwent elective lymph node dissection (ELND). The decision to perform ELND was left up to the individual surgeon caring for the patient. Fourteen (64%) of the patients undergoing ELND had histologically positive nodes, and 8 patients had negative lymphadenectomies (Fig. 3). All 13 patients with subungual melanomas had lesions  $\geq$ 1.5 mm in thickness. Digital amputa-

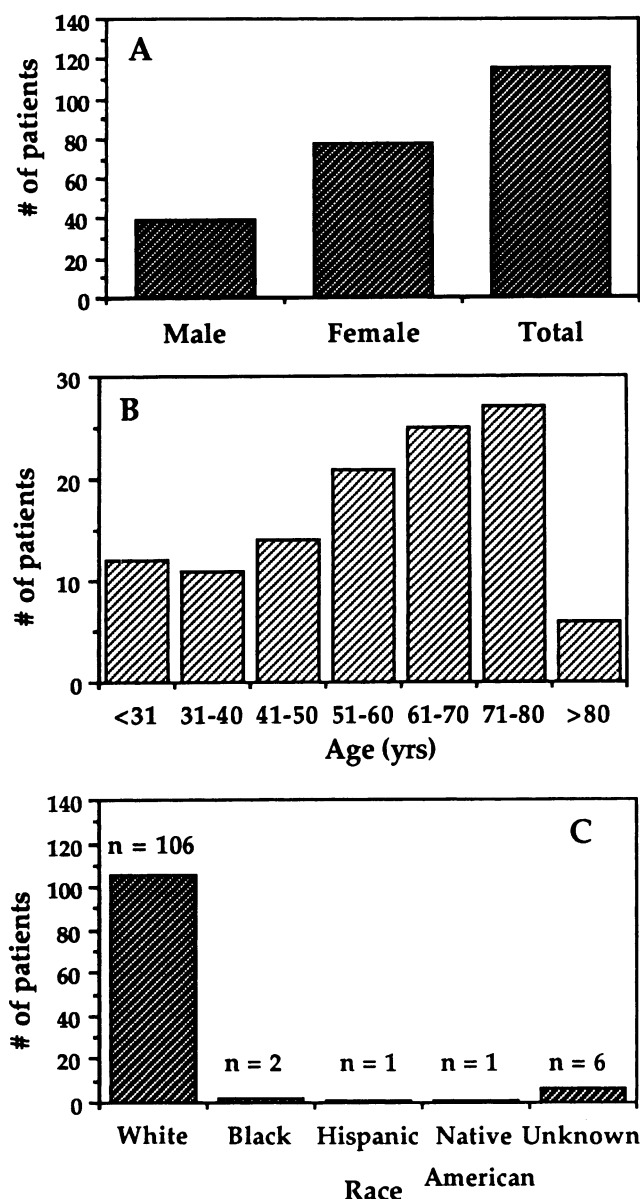


Figure 1. Categorization of patients with hand or foot melanomas by (A) gender, (B) age, and (C) race.

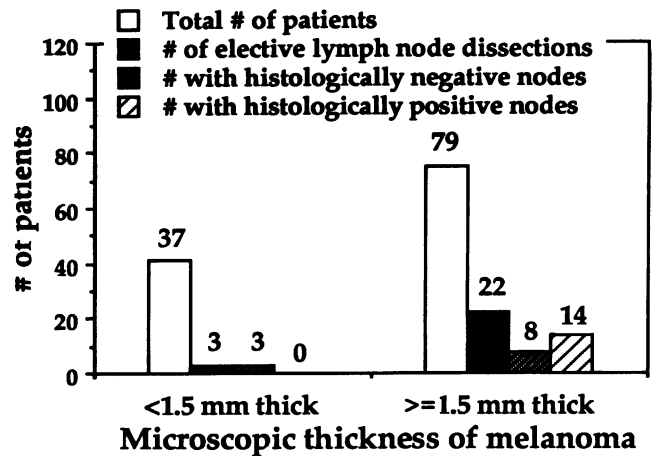
tion was required in these individuals to achieve local control. Nonetheless, 6 (46%) of 13 had evidence of nodal disease at the time of presentation or at ELND or had regional node metastases develop within 1 year of initial diagnosis. In patients with acral lentiginous melanoma, 71% presented with lesions  $\geq$ 1.5-mm thick (Table 1) and were treated with wide excision or amputation. A local recurrence developed in only two (6%) of these patients, but nodal metastases or systemic disease or both developed in 19 (56%) of 34 patients (Fig. 2B). Patients with dorsum lesions (superficial spreading or nodular melanoma)  $\geq$ 1.5 mm in thickness also were noted to have high metastatic rates (Fig. 2B).

**Table 1. HISTOLOGIC TYPES OF MELANOMA**

Type	Total No. of Patients	No. of Patients with Lesions <1.5 mm	No. of Patients with Lesions ≥1.5 mm
Acral lentiginous	48	14	34
Subungual	13	0	13
Dorsum of hand or foot	55 (45 SSM, 10 NM)	23	32
Total	116	37	79

SSM = superficial spreading melanoma; NM = nodular melanoma.

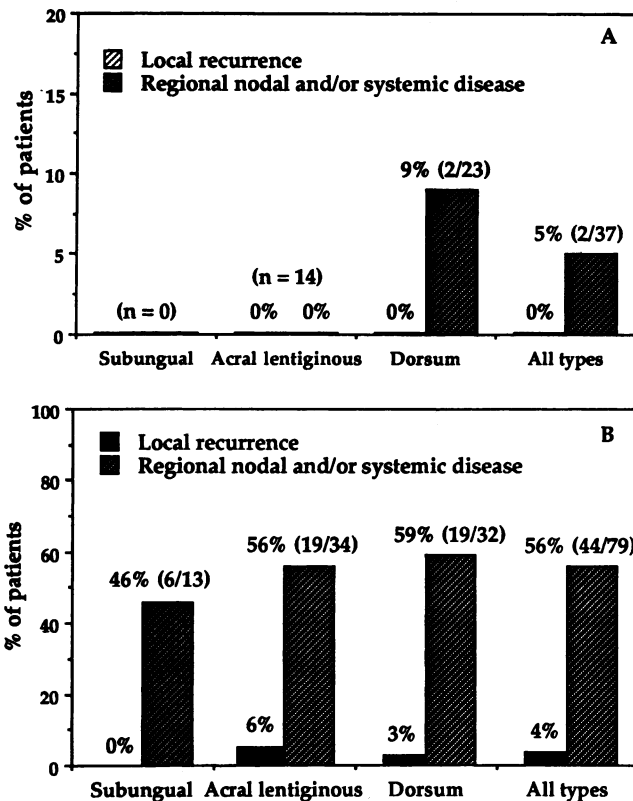
Recurrence rates also were evaluated by type of surgical therapy. Patients with lesions <1.5 mm in thickness were treated effectively with 1-cm margin of excision of normal skin around the primary. There was no difference in local recurrence rates or subsequent development of regional metastases when compared to those of patients treated with a wider margin of excision (Fig. 4A). A regional nodal metastases developed subsequently in one



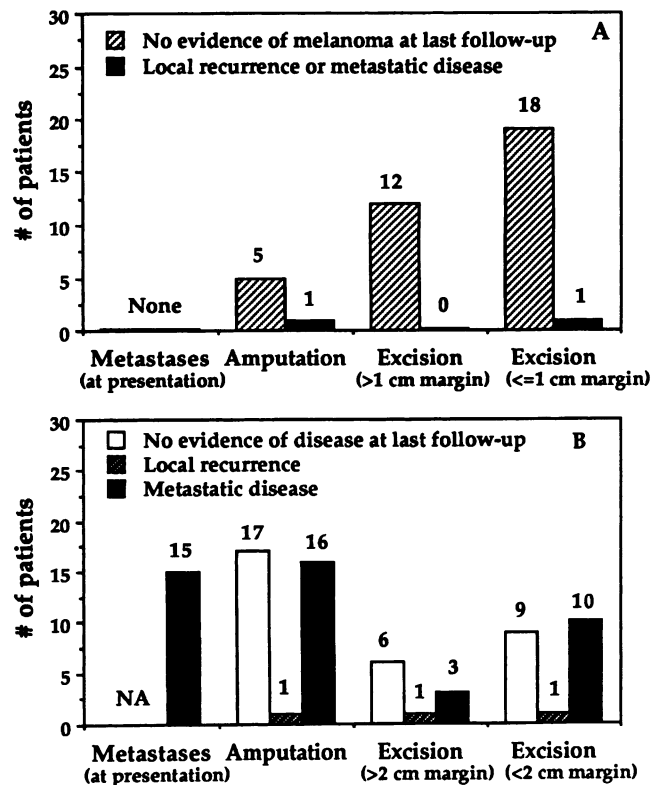
**Figure 3.** Histologic results of elective lymph node dissections performed in patients with melanomas <1.5 mm and ≥1.5 mm in thickness. Some of the 22 patients with lesions ≥1.5 mm may have had regional adenopathy secondary to the recent excision of the primary.

patient with a melanoma of the hand treated with primary excision alone with <1-cm margin.

Patients with melanomas ≥1.5 mm in thickness were



**Figure 2.** Percentage of patients with local recurrences and metastatic disease by histologic type. (A) Patients with melanomas <1.5-mm thick. (B) Patients of lesions ≥1.5-mm thick.



**Figure 4.** Number of patients with local recurrence or metastatic disease as a function of type of surgical treatment of the primary. (A) Patients with melanomas <1.5-mm thick. (B) Patients of lesions ≥1.5-mm thick. Mean follow-up was 67 months.

treated with margins between 1.5 and 4 cm, making it difficult to evaluate whether a narrow margin would offer effective local control. It was quite apparent in these individuals, however, that the incidence of synchronous or metachronous regional nodal disease or systemic metastases was higher than that observed in patients with lesions <1.5 mm in thickness (5% vs. 56% overall,  $p < 0.05$ ). Despite amputation in 28 patients (13 for subungual melanomas, 15 for other histologic types on the digits), distant failure rates were high, despite good local control (Fig. 4). Regional or systemic disease or both also were high in patients with lesions who could be treated with wide excision that did not require amputation.

As one would predict, plastic surgical procedures were more common in patients with lesions  $\geq 1.5$ -mm thick. Amputation was necessary in 6 of 37 patients with melanomas <1.5 mm in thickness compared to that in 34 of 79 patients with lesions  $\geq 1.5$  mm in thickness ( $p < 0.05$ ). Skin grafting also was more common in patients with lesions  $\geq 1.5$  mm in thickness compared to that in patients with lesions <1.5-mm thick (21 of 79 skin grafts vs. 0 of 37 skin grafts,  $p < 0.05$ ).

## DISCUSSION

Although once a relatively rare tumor, melanoma has tripled in incidence in the past 3 decades, such that it is one of the fastest-growing cancers in the United States. It widely is accepted that melanoma is best treated surgically, but despite several well-designed clinical trials, the optimal surgical management of cutaneous melanomas is not clear entirely, especially in patients with intermediate-thickness lesions. Although there is agreement that regional lymph node dissection is indicated for most patients with clinically positive nodes, the role of elective lymph node dissection in patients with nodal basins that are normal to palpation is not established definitively.<sup>4-7</sup> The rationale for elective lymph node dissection is that melanoma may spread sequentially first to regional lymph nodes and then to distant metastatic sites. Removal of lymph nodes that contain micrometastatic disease before dissemination to distant metastatic sites may improve disease-free survival and may cure the patient. A recent randomized surgical trial showed that elective lymphadenectomy resulted in a modest increase in survival in patients 60 years of age or younger who had lesions between 1 and 2 mm in thickness.<sup>7</sup> Patients with lesions thicker than 2 mm were not benefited by elective lymph node dissection, suggesting that the incidence of occult of systemic disease is higher in these individuals and lymphadenectomy does not impact outcome. In the current study, the number of patients undergoing immediate lymphadenectomy was too small to evaluate the impact of ELND on survival.

The optimal margin of excision necessary to prevent local recurrence also has been the subject of debate. Among the most aggressive recommendations were those suggested in reports in the 1960s that advocated up to a 15-cm margin on the proximal side of the primary to encompass any disease in transit to the regional nodes.<sup>9</sup> The historic 5-cm rule also was arbitrary, and it was not based on any substantive scientific foundation.<sup>3</sup> Sixty years ago, it was stated<sup>10</sup> that "since microscopic examination of a primary melanoma reveals invasion of the lymphatic structure for about 3 cm beyond the border of the lesion, excision should include a margin of at least this dimension of apparently normal tissue," but there were no data supporting this contention. Many authorities currently recommend a 2-cm margin for melanomas greater than 1 mm in thickness as determined pathologically by an ocular micrometer. These recommendations are based on data from clinical trials that showed no difference in survival or local recurrence rates between 2 and 4 cm margins for intermediate-thickness lesions.<sup>2</sup> Our review suggests that, in selected circumstances, a narrower margin is safe and effective, a notion supported by others.<sup>3</sup>

In this study, we reviewed retrospectively the charts of 116 patients with a diagnosis of primary cutaneous melanomas of the hand or foot treated at a single institution over a 15-year time span. We arbitrarily separated patients into those with lesions less than and greater than 1.5 mm in thickness. This cutoff did seem to separate patients into those with favorable and unfavorable lesions, regardless of histologic subtype or type of surgical therapy. In a previous study, Day et al.<sup>11</sup> reported that patients with foot melanomas <3 mm in thickness had a 100% 5-year disease-free survival compared to a 0% 5-year disease-free survival in patients with lesions  $\geq 3$  mm in thickness. However, we would emphasize that such a separation is not intended to imply a threshold or to suggest that all lesions thicker than 1.5 mm are associated with a poor outcome. Rather, like melanomas of other sites, a continuum exists for hand and foot melanomas (e.g., patients with lesions between 1.5 and 2 mm in thickness have a better prognosis than do patients with lesions between 3.5- and 4-mm thick).

Our review of the clinicopathologic data that make up the current study is in agreement with prior recommendations that a full-thickness excisional biopsy performed with the patient under local anesthesia is the preferred biopsy technique for suspicious pigmented lesions of the hands and feet. An incisional biopsy is justified for lesions where primary closure cannot be achieved. Shave biopsies are contraindicated because they prevent an adequate assessment of melanoma depth. Biopsy of subungual pigmented lesions should be performed by first removing the nail plate using a digital block. The biopsy incision of

**Table 2. TREATMENT RECOMMENDATIONS FOR HAND AND FOOT MELANOMAS**

Microscopic Thickness of Primary Melanoma	Dorsum	Subungual	Acral Lentiginous
<1.5 mm	Excision with 1 cm margin*	Amputation of distal phalanx	Excision with 1 cm margin*
≥1.5 mm	Excision with 2 cm margin* plus sentinel lymph node biopsy†	Amputation of distal phalanx plus sentinel lymph node biopsy†	Excision with 2 cm margin* plus sentinel lymph node biopsy†

\* Skin grafting may be necessary in some cases.  
† Regional lymphadenectomy if sentinel node contains melanoma.

the underlying nail bed should be oriented longitudinally, and the excised nail plate should be examined histologically in addition to the underlying nail bed.

Similar to a 1985 study,<sup>12</sup> our patient population largely was white, and there considerably were more foot melanomas than hand lesions. Our study had a female-to-male ratio of 2:1, consistent with previous studies<sup>1</sup> that show an overall increase of lower extremity melanomas in females. The median age at presentation in our study was 60. It has been observed that older patients present with more invasive melanomas,<sup>1</sup> and this may explain the high rates of regional and systemic failure in the patients in this study with lesions ≥1.5 mm in thickness. In previous studies, 34% of patients (all skin sites) presented with melanomas ≥1.5 mm in thickness,<sup>1</sup> compared to the current review in which two thirds of the patients had lesions ≥1.5 mm in thickness.

The risk of a local recurrence depends on the tumor thickness, presence or absence of ulceration, and width of the surgical margin.<sup>13</sup> Our findings indicate that lesions <1.5 mm in thickness effectively can be treated surgically with a local excision with a 1-cm margin. None of the 37 patients with lesions of this depth had a local recurrence, and rates of regional failure were low. A previous study, which focused principally on melanomas of other sites, led to the recommendation of a 2-cm margin for lesions >1 mm in thickness, but patients only were randomized to receive a 2- or 4-cm margin of excision. A recent review of the literature suggests that narrower margins will afford equally good local control.<sup>3</sup>

The safety and efficacy of a narrower margin for melanomas of the hands and feet have implications for wound healing and postoperative recovery. Primary closure is associated with faster healing, fewer complications, generally a better functional result, and reduced expenses. Primary closure with a 2-cm margin for melanomas of the trunk or extremity is more feasible than it is for lesions of the hand and foot. Although reconstruction-type procedures (34 amputations, 21 skin grafts) frequently were necessary to achieve closure of thicker lesions in this study because of the wider resection margins, the need for such procedures was reduced greatly in patients with

lesions <1.5-mm thick (6 amputations, 0 skin grafts). Unfortunately, we could not draw conclusions about the optimal margin of resection for thicker lesions in this study because most of these melanomas were treated with a 1.5- to 4-cm margin. In view of these findings, the tendency to skimp on historically recommended margins to achieve primary closure appears to be justifiable, particularly for melanomas <1.5 mm in thickness.

The role of ELND in the management of patients with melanoma remains controversial.<sup>4-7,14</sup> The principal disadvantage of elective lymph node dissection is that patients without metastatic tumor in their lymph nodes are subjected to unnecessary surgery. This problem now can be circumvented with intraoperative sentinel lymph node mapping,<sup>8</sup> which allows the potential benefits of elective lymph node dissection to be obtained while avoiding unnecessary lymphadenectomies. If metastatic melanoma is identified in the sentinel node, a complete lymphadenectomy should be performed. Conversely, the absence of metastatic melanoma in this lymph node is indicative of the absence of melanoma in the remaining regional lymph nodes in >95% of cases. Given its accuracy and safety, lymphatic mapping is recommended in all patients with melanomas of the hand or foot with lesions >1.5-mm thick (Table 2). Although cost analysis was not possible from our data, the savings associated with the proper selection of patients who are candidates for lymphadenectomy could be substantial.

Tumor thickness should not be the sole criterion for deciding which patients may benefit from elective lymph node dissection. Heaton et al<sup>15</sup> reviewed 46 cases of subungual melanomas and identified 6 factors that affected patient survival significantly: stage at diagnosis, percentage of aneuploid cells, presence of ulceration, bone invasion, thickness of the primary lesion, and percentage of cells in S phase. Thus, the presence or absence of these variables and operative morbidity all should be taken into account when deciding whether to perform an elective lymph node dissection. Although a patient's risk for occult regional disease without distant occult metastases can be estimated, intraoperative sentinel lymph node mapping

may allow definitive identification of patients with subclinical regional lymph node metastases.

## References

- Balch CM, Houghton AN, Milton GW, et al., eds. *Cutaneous melanoma*. 2nd ed. Clinical Management and Treatment Results Worldwide. Philadelphia: JB Lippincott; 1992.
- Balch CM, Urist MM, Karakousis CP, et al. Efficacy of 2-cm surgical margins for intermediate-thickness melanomas (1 to 4 mm): results of a multi-institutional randomized surgical trial. *Ann Surg* 1993; 218:262–269.
- Piepkorn M, Barnhill RL. A factual, not arbitrary, basis for choice of resection margins in melanoma. *Arch Dermatol* 1996; 132:811–814.
- Balch CM. The role of elective lymph node dissection in melanoma: rationale, results, and controversies. *J Clin Oncol* 1988; 6.1:163–172.
- Veronesi U, Cascinelli N, Adamo J, et al. Thin stage I primary cutaneous malignant melanoma: comparison of excision with margins of 1 or 3 cm. *N Engl J Med* 1988; 318:1159–1162.
- Slingluff CL, Stidham KR, Ricci WM, et al. Surgical management of regional lymph nodes in patients with melanoma. *Ann Surg* 1994; 219:120–130.
- Balch CM, Soong SJ, Bartolucci AA, et al. Efficacy of an elective regional lymph node dissection of 1 to 4 mm thick melanomas for patients 60 years of age and younger. *Ann Surg* 1996; 224:255–266.
- Morton DL, Wen D–R, Wong JW, et al. Technical details of intraoperative lymphatic mapping for early stage melanoma. *Arch Surg* 1992; 127:392–399.
- McNeer G, Cantin J. Local failure in the treatment of melanoma. *Am J Roentgenol Rad Ther Nucl Med* 1967; 99:791–808.
- Butterworth T, Klauder JV. Malignant melanomas arising in moles: report of 50 cases. *JAMA* 1934; 102:739–745.
- Day CL, Sober AJ, Kopf AW, et al. A prognostic model for clinical stage I melanomas of the lower extremity. *Surgery* 1981; 89:599–603.
- Hughes LE, Horgan K, Taylor BA, et al. Malignant melanoma of the hand and foot: diagnosis and management. *Br J Surg* 1985; 72:811–815.
- Tanabe KK, Souba WW. Melanoma. In: Cameron JL, ed. *Current Surgical Therapy*. St. Louis, MO: Mosby Yearbook Publishers; 1995.
- Cady B, Coit DG, eds. *Lymph Node Dissection in Malignant Melanoma*. *Surgical Oncology Clinics of North America*, 1992; 1:157–333.
- Heaton KM, El–Naggar A, Ensign L, et al. Surgical management and prognostic factors in patients with subungual melanoma. *Ann Surg* 1994; 219:197–204.

## Discussion

DR. EDWARD M. COPELAND, III (Gainesville, Florida): Dr. Souba, Dr. Tseng, and their colleagues have produced a very useful study to decide on surgical therapy for melanoma of the hands and feet: A one centimeter margin and no elective lymph node dissection for lesions less than 1.5 mm, and a 2 cm margin and an elective lymph node dissection for lesions greater than 1.5 mm in size. In their study, patients with thick melanomas had a 50% or greater incidence of regional lymph node metastases.

They favor sentinel lymph node biopsy. Based on their data, I would favor elective lymph node dissection because of the high rate of nodal metastasis and because, in my hands, a sentinel node is less often accurately identified by isosulfan blue or a radio tracer when the distance required to travel is from the tip of the extremity to either the axilla or to the groin.

Have the authors done the sentinel node technique for any of these reported cases? And, if so, with what degree of success?

In-transit metastases have been a problem described in some reported series with melanomas of the hands and feet. Did any of these patients develop in-transit metastasis? If so, what is the recommend treatment for in-transit metastasis at the MGH?

My last remaining question: In treating sub-ungual melanomas of the finger, is it safe to amputate only the distal digit?

DR. WILLIAM C. WOOD (Atlanta, Georgia): Dr. Griffen, Dr. Copeland, Fellows, and Guests. I want to thank Dr. Tseng and Dr. Souba and their colleagues for the privilege of reviewing this very fine manuscript.

Although only 5% of patients with melanoma present in the distal extremity, this is one of the problematic areas in managing malignant melanoma, and your contribution is most helpful. You address two issues: margins and local control, and the candidates for sentinel node staging. And I have four questions.

The first is regarding local control. Even in the tumors greater than 1.5 mm in thickness, there were only three local failures. What was the thickness of those three lesions?

The second question is similar. I am very unhappy with thresholds in biology for two reasons. First, I do not think they are natural. Was there an absolute in your data where anything over 1.5 mm seemed to have a random likelihood of recurrence and of lymph node metastases? Is there a linear relationship to thickness, as you get thicker and thicker? Or even a geometric relationship, as has been suggested?

My other problem about thresholds is that once a threshold of 1.5 mm is published, in the clinic over the next few weeks we see a host of patients who all seem to have lesions that are either 1.4, 1.5, or 1.6 mm in thickness, which is somewhat problematic.

Third, did acral lentiginous lesions, as compared with subungual lesions, as compared with lesions of the dorsum of the hand or foot, have any apparent effect on outcome? Or was thickness the only determinant? Did you look at microsatellites, for example?

Also, you combined hand and foot. Did you see any difference between hands and feet that was apparent as a trend, at least?

That was my fourth question, and I wish to commend the authors for a very fine presentation, and I thank the Society for the privilege of commenting.

DR. KIRBY I. BLAND (Providence, Rhode Island): Vice President Griffen, Secretary Copeland, Members, and Guests of the Association. I, too, would like to congratulate Dr. Souba, Dr. Tseng, and their co-authors for bringing this important clinical review to the Association.

The authors observed in this retrospective analysis that cutaneous melanoma of the hands and feet, less than 1.5 mm thick-