Impact of Guidance Provided by a Multispectral Digital Skin Lesion Analysis Device Following Dermoscopy on Decisions to Biopsy Atypical Melanocytic Lesions

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ABSTRACT

Objective: To determine how a multispectral digital skin lesion analysis (MSDSLA) device data affects the biopsy performance of dermatologists and non-dermatologist practitioners following clinical and dermoscopic pigmented lesion evaluation. **Design:** MSDSLA employs near infrared light to image and analyze pigmented skin lesions. MSDSLA generates a "classifier score" based on morphological disorganization. Using a logistical regression model, 1) a probability of being melanoma and, 2) a probability of being melanoma, atypical melanocytic hyperplasia, or a high grade dysplastic nevus is computed. Participants were shown clinical images of 12 lesions (2 melanomas *in situ*, 3 invasive melanomas, and 7 low grade DNs). They were asked first if they would biopsy the lesion based on clinical images, again after observing dermoscopy images, and once more when presented with MSDSLA probability information. **Setting:** National dermoscopy conference. **Participants:** Sixty-four healthcare providers; 30 dermatologists and 34 non-dermatologist practitioners. **Measurements:** Sensitivity, specificity, diagnostic accuracy, biopsy rates **Results:** For the 30 dermatologists, sensitivity was 65 percent after clinical evaluation (C) and 65% post-dermoscopy (D) but improved to 91% after MSDSLA. For the 34 non-dermatologist practitioners, sensitivity improved from 66 percent (C) to 70 percent (D) to 95 percent after MSDSLA. With MSDSLA information, dermatologist specificity increased from 40 percent (D) to 58 percent while non-dermatologist practitioners specificity increased from 34 percent (D) to 55 percent. Diagnostic accuracy of malignant and benign lesions decreased for both groups 55 percent (C) to 51 percent (D) for dermatologists and 54 percent (C) to 49 percent (D) for non-dermatologist practitioners. However, diagnostic accuracy increased to 72 percent for dermatologists and 72 percent for non-dermatologist practitioners with MSDSLA data. Non-melanoma biopsy percentages by dermatologists increased from 53 percent (C) to 60 percent (D), but decreased to 42 percent when provided with MSDSLA data. Similarly, non-dermatologist practitioners' biopsy percentages of nonmelanomas increased from 55 percent (C) to 66 percent (D) and decreased to 45 percent with MSDSLA. **Conclusion:** Decisions to biopsy atypical melanocytic lesions were more sensitive and specific when MSDSLA information was provided for both dermatologists and nondermatologist practitioners. Both groups were also less likely to biopsy nonmelanomas after MSDSLA evaluation. The authors' results suggest providing practitioners with MSDSLA data leads to improved biopsy accuracy decreasing the number of nonessential biopsies for nonmelanocytic lesions even after dermoscopic evaluation. (*J Clin Aesthet Dermatol.* 2015;8(9):21–24.)

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TABLE 1. Pigmented lesion biopsy decision data for dermatologists vs. non-dermatologist practitioners following clinical evaluation, subsequent dermoscopy, and subsequent MSDSLA

DERMATOLOGISTS (N = 30)	CLINICAL EVALUATION	AFTER DERMOSCOPY (*P*)	AFTER MSDSLA (*P*)
Sensitivity	65%	65% (NS)	91% (<0.0001)
Specificity	47%	40% (NS)	58% (0.0002)
Diagnostic accuracy	55%	51% (NS)	72% (<0.0001)
% Low grade dysplastic nevus biopsies	53%	60% (NS)	42% (0.0002)
% All lesions biopsied	58%	62% (NS)	62% (<0.0001)
% Biopsying all 5 malignant melanomas	4%	10% (NS)	72% (0.002)
NON-DERMATOLOGIST PRACTITIONERS (N = 34)	**CLINICAL EVALUATION**	**AFTER DERMOSCOPY (*P*)**	**AFTER MSDSLA (*P*)**
Sensitivity	66%	70% (NS)	95% (<0.0001)
Specificity	46%	34% (0.01)	55% (<0.0001)
Diagnostic accuracy	54%	49% (NS)	72% (<0.0001)
% Low grade dysplastic nevus biopsies	53%	66% (0.01)	45% (<0.0001)
% All lesions biopsied	59%	68% (0.01)	66% (<0.0001)
% Biopsying all 5 malignant melanomas	13%	6% (NS)	78% (<0.0001)

MSDSLA=Multispectral Digital Skin Lesion Analysis; NS=Not significant

Early detection of melanoma improves survival.[1] Suspicious pigmented lesions are typically evaluated by clinical examination and sometimes dermoscopy.[2] New technologies may provide additional clinically significant information to augment accurate biopsy decisions.[3,4]

This study was designed to determine how information provided by a multispectral digital skin lesion analysis (MSDSLA) device (MelaFind, MELASciences Inc, Irvington, New York)[4,5] affects the biopsy decisions of dermatologists and non-dermatologist practitioners (NDPs) following clinical and dermoscopic pigmented skin lesion evaluation. MSDSLA employs visible and near-infrared light (430–950nm) to image lesions up to 2.5mm below the skin surface. MSDSLA then analyzes pigmented lesions across 10 spectral bands using 75 unique analytical algorithms to determine a "classifier score" based on the degree of morphological disorganization. Validated on a database of 1,632 pigmented lesions,[5] MSDSLA also provides the probability of an analyzed lesion being

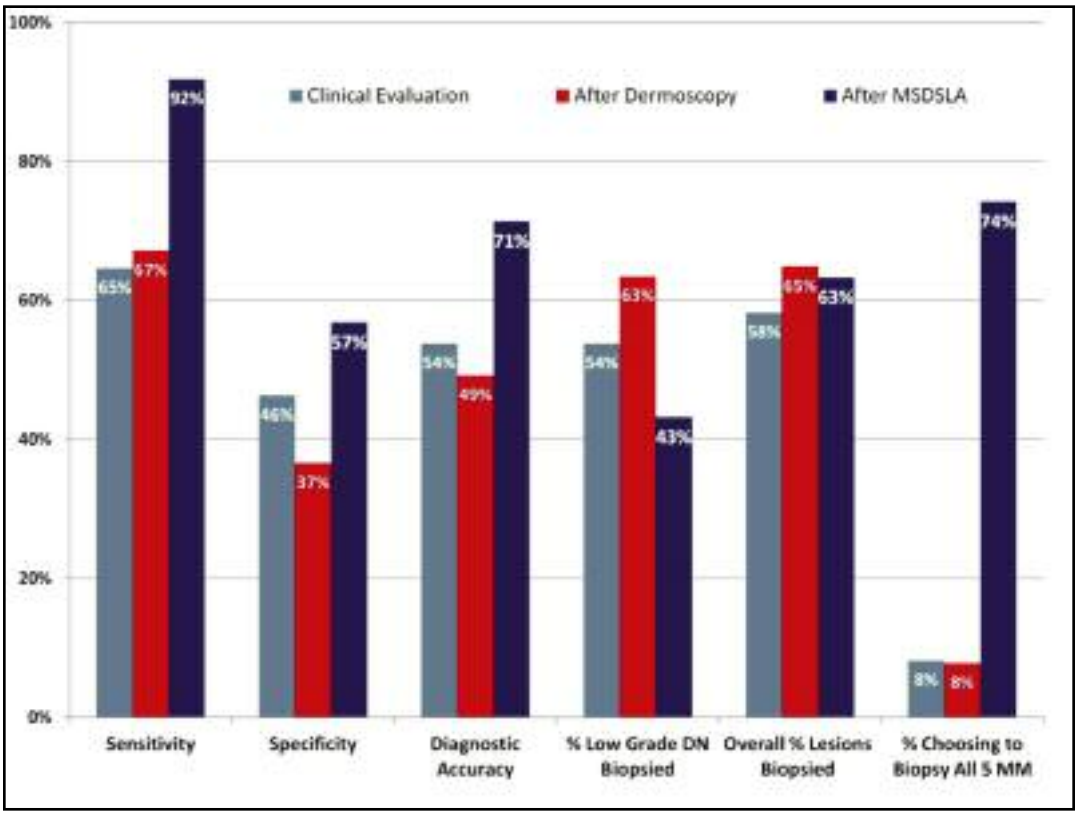

Figure 1. Pigmented lesion biopsy decision analysis comparing clinical evaluation, subsequent dermoscopy, and subsequent MSDSLA for entire study group.

melanoma and melanoma, atypical melanocytic hyperplasia (AMH) or a high-grade dysplastic nevus (DN) to the clinician.

METHODS

Sixty-seven practitioners were enrolled in a cross-sectional reader study at a national dermoscopy conference. Participants were shown high-resolution clinical images of 12 lesions (2 melanomas *in situ*, 3 invasive melanomas, and 7 low-grade DNs) previously analyzed by MSDSLA.[5] Participants were first asked if they would biopsy the lesion based on clinical images, again after observing high-resolution dermoscopy images, and again when subsequently shown MSDSLA probability information. Each response was input using a wireless keypad. Answers were withheld from participants until all data had been collected to avoid bias. Biopsy decisions were compared for clinical evaluation, after dermoscopy, and then after the additional MSDSLA information was provided.

RESULTS

Data were analyzed from 67 practitioners (Table 1 and Figure 1). Three participants did not identify provider status. For the 30 dermatologists, sensitivity was 65 percent after clinical evaluation (C) and 65 percent post-dermoscopy (D), but 91 percent after MSDSLA (P<0.0001). For the 34 NDPs, sensitivity improved from 66 percent (C) to 70 percent (D) to 95 percent after MSDSLA (P<0.0001). With MSDSLA, dermatologist specificity increased from 40 percent (D) to 58 percent (P=0.0002) while NDP specificity increased from 34 percent (D) to 55 percent (P<0.0001). Diagnostic accuracy increased from 51 percent (D) to 72 percent (P<0.0001) for dermatologists and from 49 percent (D) to 72 percent (P<0.0001) for NDPs after integrating the MSDSLA data into the biopsy decision. Nonmelanoma biopsy percentages by dermatologists increased from 53 percent (C) to 60 percent (D), but decreased to 42 percent (P=0.0002) with MSDSLA. Similarly, NDP biopsy percentages of nonmelanomas increased from 53 percent (C) to 66 percent (D) (P=0.01) and decreased to 45 percent with MSDSLA (P<0.0001). The overall number of lesions biopsied did not significantly increase (58–63% post-MSDSLA).

Dermatologists choosing to biopsy all five malignant lesions increased from four percent (C) to 10 percent (D) to 72 percent (P=0.02) after MSDSLA. NDPs biopsying all five melanomas went from 13 percent (C) to six percent (D) to 78 percent (P<0.0001) after MSDSLA. Since both groups were also significantly less likely to biopsy non- malignant melanoma, atypical melanocytic hyperplasia, and high-grade dysplastic nevi lesions after MSDSLA, biopsy ratios improved after the additional information was provided to the clinician. Therefore, more melanomas and fewer low-

grade DNs were subsequently selected for biopsy without a significant concomitant increase in biopsy numbers.

CONCLUSIONS

Decisions to biopsy atypical melanocytic lesions were more sensitive, specific, and accurate after providing MSDSLA probability information to dermatologists and NDPs even after dermoscopic evaluation. Both groups were also less likely to biopsy low grade DN after MSDSLA information was obtained.

The results of this study suggest providing practitioners with MSDSLA data leads to improved diagnostic accuracy, thereby decreasing the number of nonessential biopsies for low grade lesions. Even after dermoscopic evaluation, this study suggests that MSDSLA may significantly further augment the accurate evaluation of suspicious pigmented skin lesions.

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