

A Risk-Scoring Classifier for the Diagnosis and Management of Atypical Melanocytic Lesions of the Palms: the iDScore_{palmar} Model

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Citation: Tognetti L, Lo Conte S, Miracapillo C, Lallas A, Moscarella E, Giuffrida R, et al. A Risk-Scoring Classifier for the Diagnosis and Management of Atypical Melanocytic Lesions of the Palms: the iDScore_{palmar} Model. *Dermatol Pract Concept*. 2026;16(1):6487. DOI: <https://doi.org/10.5826/dpc.1601a6487>

Accepted: July 14, 2025; **Published:** January 2026

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Funding: None.

Competing Interests: None.

Authorship: All authors have contributed significantly to this publication.

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Introduction

Acral melanoma affects soles, nailbeds and palms: the palmar type is the rarest, especially among Caucasians, accounting for less than 2% of melanoma cases. Its prognosis is poor due to delayed detection, and amputation is often a direct consequence.[1] Adequate recognition of dermoscopic features is crucial to timely diagnosis. Only two algorithms have been proposed to date, but entirely dermoscopic, designed for both palmar and plantar lesions [2-3]. Furthermore, because they reflect lesion morphology of Japanese/Korean population, they are not fully applicable to European population. Moreover, they can miss palmar early melanomas (pEM) ≤ 6 mm in diameter without parallel ridge pattern.

We thus aimed to develop a Bayesian model to estimate the risk of a palmar atypical melanocytic lesion (pAML) being malignant that can combine, for the first time, a series of characteristic dermoscopic and morphological data of the lesion with some of the patient's relevant anamnestic and clinical data.

Findings

We collected from 17 European centers a total of 51 pAMLs (14 pEM, 37 palmar atypical nevus -pAN) with histopathological diagnosis, dermoscopic and clinical images, maximum lesion diameter, age, sex, and exact palmar location based on nine areas [4]. All lesions were evaluated in teledermoscopy

mode by 104 dermatologists and 51 residents, who provided an intuitive diagnosis (pEM or pAN) and a management decision (short/long follow-up, biopsy, excision). Pattern analysis required assessing the presence/absence of 12 dermoscopic criteria: asymmetry of structure, asymmetry of color, parallel ridge pattern, irregular blotches, regression structures, blue-white veil, irregular streaks, irregular diffuse pigmentation, irregular fibrillar pattern, parallel furrow pattern, regular fibrillar pattern, and lattice-like pattern. These were selected from literature consensus and morphology of both equivocal and clear-cut pEM [5]. Each criterion was defined as present/absent in a lesion according to majority consensus among the participants, obtaining about 265 dermoscopic evaluations. From this palmar dataset, a testing set (5%) was first selected; the rest was split into training (80%) and validation (20%) sets, preserving the pEM:pAN ratio (1:2.5). Associations between the 12 dermoscopic features and histopathology were evaluated by chi-square test. The model was built using a 5-fold cross validation forward stepwise logistic regression based on the area under the ROC curve (AUC). On the validation set, the model with the highest AUC was chosen, and score thresholds were estimated using top-left method. The BRAAF-score for each evaluation was also derived.

The iDScore_palmar model included five parameters (Table 1). A cut-off of 4 was selected. The diagnostic accuracy reached by the model on the testing set was 0.84 (95% confidence interval (CI): 0.79–0.89), that of dermatologists/

Table 1. Integrated risk scoring model for the differential diagnosis of palmar early melanomas (pEM) from palmar atypical nevi (pAN): the iDScore palmar checklist.

Five Variables		Points
Maximum diameter		
>8 mm		1
Age		
≥ 65 yrs		5
Location		
Finger area (fingertips, interdigital spaces, lateral surface of the fingers)		one
Dermoscopy		
presence of "asymmetry of colors" pattern		2
absence of "parallel furrow pattern" pattern		2
Total score		0-11
Lesion score	Risk classification	Management suggestion
S=0-3	Low/medium-risk lesion	follow-up
S=4-11	High/very high-risk lesion	biopsy/excision

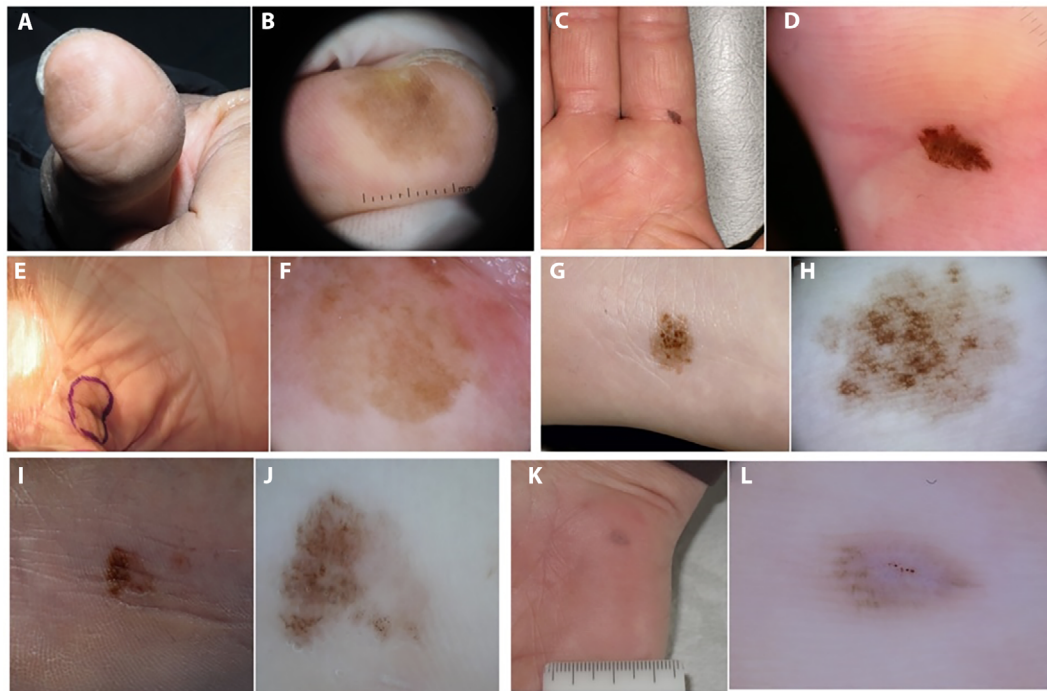


Figure 1. Clinical and dermoscopic appearance of six clinically and dermoscopically atypical palmar melanocytic lesions (pAML), excised to rule out melanoma, located in different palmar areas. Clinical (A) and dermoscopic (B) pictures of a pAML on the volar surface of the finger, 12 mm in diameter, in a 69-year-old male showing asymmetry of colors and absence of parallel furrow pattern under dermoscopy; the lesion score was S=11 according to the iDScore_plantar model and was a palmar melanoma according to histopathology. Clinical (C) and dermoscopic (D) pictures of a pAML on the finger, 5 mm in diameter, in a 25-year-old female, showing absence of parallel furrow pattern under dermoscopy; the lesion score was S=3 according to the iDScore_plantar model and was a palmar atypical nevus according to histopathology. Clinical (E) and dermoscopic (F) pictures of a pAML on the thenar surface, 12 mm in diameter, in a 88-year-old female showing absence of parallel furrow pattern and presence of asymmetry of colors under dermoscopy; the lesion score was S=10 according to the iDScore_plantar model and was an early melanoma according to histopathology. Clinical (G) and dermoscopic (H) pictures of a pAML on the thenar surface, 12 mm in diameter, in a 12-year-old female; the lesion score was S=1 according to the iDScore_plantar model and was a palmar nevus according to histopathology. Clinical (I) and dermoscopic (J) pictures of a pAML on the central metacarpal area, 5 mm in diameter, in a 66-year-old female showing absence of parallel furrow pattern and presence of asymmetry of colors under dermoscopy; the lesion score was S=9 according to the iDScore_plantar model and was an early melanoma according to histopathology. Clinical (K) and dermoscopic (L) pictures of a pAML on the hypothenar surface, 5 mm in diameter, in a 49-year-old female showing asymmetry of structures of colors under dermoscopy; the lesion score was S=2 according to the iDScore_plantar model and was a palmar nevus according to histopathology.

residents 0.78% (95% CI: 0.73–0.84), and that of the BRAAF model 0.64 (95% CI: 0.49–0.77). Taking into account participants' responses on diagnosis/management, we estimated that, using the iDScore_palmar model, they could reduce the number of misdiagnosed pEMs by 14.5%, improve the correct management of pANs by 10.1%, reduce the quote of misdiagnosed pAN by 11.1 %, and reduce unnecessary surgeries for pANs by 15.7%.

Conclusion

The iDScore_palmar model is a simple tool proposed to rapidly calculate a lesion score S (Figure 1) and support clinicians in diagnosing and managing pAML.

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