Palmoplantar melanocytic nevi: dermoscopic and histopathological correlation

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Abstract

Introduction. A nevus is defined as a circumscribed malformation of the teguments, which may be dysembryoplastic or hereditary, temporary or permanent. Nevi are important given their well-known causal relationship with melanoma, a percentage of which results from preexisting melanocytic nevi. Therefore, it is important to distinguish nevi at risk of undergoing change. Dermoscopy is a non-invasive technique, particularly useful to distinguish pigmented melanocytic lesions, which may be nevi or melanomas, from pigmented non-melanocytic lesions. Palmoplantar skin exhibits special dermoscopic features producing peculiar images.
Objectives. To describe acral dermoscopic patterns, their frequency, and dermoscopic and histopathologic correlation of palmoplantar nevi, and to assess dermoscopic agreement between the researcher and an independent observer.
Material and Methods. Observational, prospective, cross-sectional and analytical study of patients with clinical diagnosis of palmoplantar melanocytic nevi. The study was conducted at Hospital Privado, Córdoba, from May 2006 through April 2007. Studied variables included age, gender, personal history, skin phototype, location, and dermoscopic and histologic patterns. All patients were observed by the researcher and by an independent observer; dermoscopy and surgery were performed on all nevi.
Results. Eighty three acral melanocytic nevi were detected in 74 skin phototype II patients. Mean age of patients was 32 years. Most frequent dermoscopic pattern was parallel furrow pattern, and most frequent was the compound histologic pattern. Dermoscopic agreement, calculated with Kappa values, was excellent.
Conclusion. The dermoscopic patterns found in our study is consistent with the reviewed literature (Dermatol Argent 2009; 15(6):420-427).

Key words: *nevi of the palms and soles, dermoscopy, histopathology.*

Introducción

A nevus (Latin word meaning mark, sign or signal) is defined as a circumscribed malformation of teguments, which may be dysembrioplastic or hereditary, temporary or permanent.

Melanocytic nevi consist of cells from the neural crest, and are important given their well-known causal relation with melanoma.[1]

A percentage of melanomas results from preexisting melanocytic nevi. Therefore, it is important to distinguish nevi with high risk of modification, a relevant data in preventing melanoma.[2,3]

Dermoscopy (also known as dermatoscopy, epiluminiscence microscopy, incident light microscopy, and skin surface microscopy) is a non-invasive diagnosis technique enabling an *in vivo* view of pigmented anatomic structures in epidermis, dermoepidermal junction, and superficial papillary dermis, which are invisible to the unaided eye.[4] This technique is particularly useful to distinguish between melanocytic and non-melanocytic pigmented lesions; and among the former, between nevus and melanoma.[5]

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Figure 1. *Parallel furrow pattern (dermoscopy).*

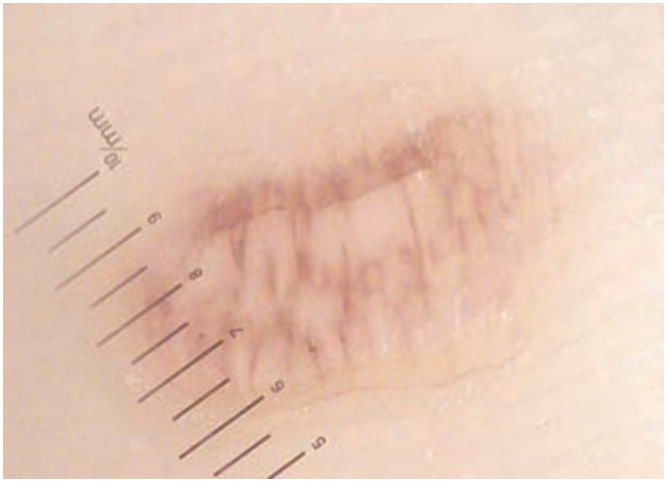

Figure 2. *Lattice-like pattern (dermoscopy).*

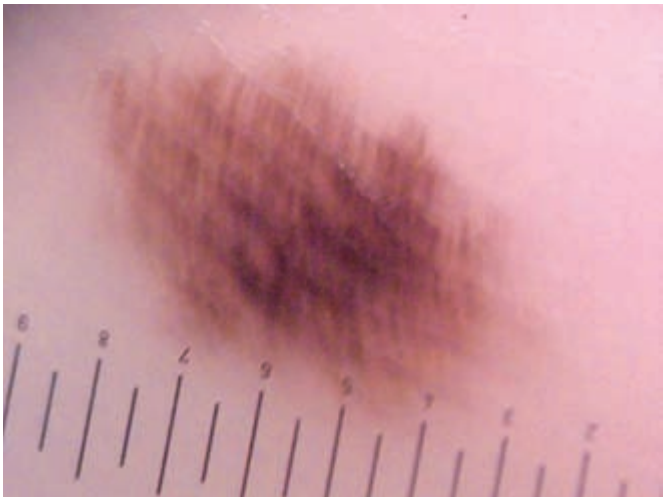

Figure 3. *Fibrillar pattern (dermoscopy).*

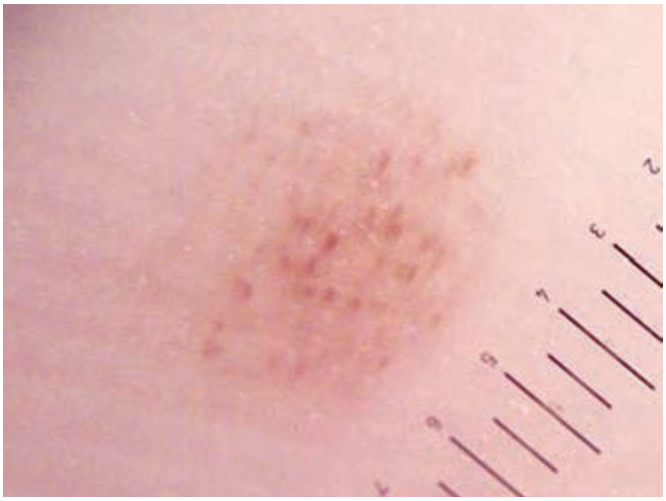

Figure 4. *Globular pattern (dermoscopy).*

Dermoscopic techniques are classified into two types: *direct technique*, where the diagnosis instrument contacts the skin; and *indirect technique*, where the diagnosis instrument does not contact the skin.

The direct technique uses *in vivo* microscopy, where the device contacting a fluid, either oil, water, or alcohol, is applied to the patient's skin; this fluid decrease light reflection, refraction and difraction. Thus, stratum corneum becomes more translucent and enables a better view of the skin.[6] The indirect technique uses *in vivo* microscopy, where the device does not contact the patient's skin, that is, there is no need for an immersion fluid. This procedure uses a polarized light dermatoscope with crossed polarized lenses allowing a simultaneous view of all the light waves dispersed on the skin, and the transmission of one light beam in only one plane.

Volar skin shows specific anatomic features that produce peculiar dermoscopic images. The skin surface appears in a parallel distribution forming dermatoglyphs, where furrows (sulcus superficialis) and ridges (crista superficialis) may be identified. This specific distribution appears due to the peculiar interpapillary processes of the volar area formed by the limiting deep ridge (under the dermatoglyph furrow) and the intermediate deep ridge (under the dermatoglyph ridges) crossed by acrosyringes.[7]

Saida et al.[5,8] described specific dermoscopic features of acral melanocytic nevi, and classified them as: *parallel furrow*, *lattice-like, fibrillar, and atypical pattern*.

In addition, these authors established four melanoma-associated dermoscopic patterns: *parallel ridge pattern, irregular diffuse pigmentation in different shades, peripheral irregular dots and globules, abrupt border cutoff*.[9] These patterns were reproduced in Caucasians, in a study carried out by Malvehy y Puig,[10] adding three patterns: *globular, homogeneous* and *reticular*.

Previous studies have reported clinical features of acral melanocytic lesions in Caucasic population. Although the dermoscopic assessment of these lesions has been described, the reviewed literature does not comprise reports of large series of patients in our population.

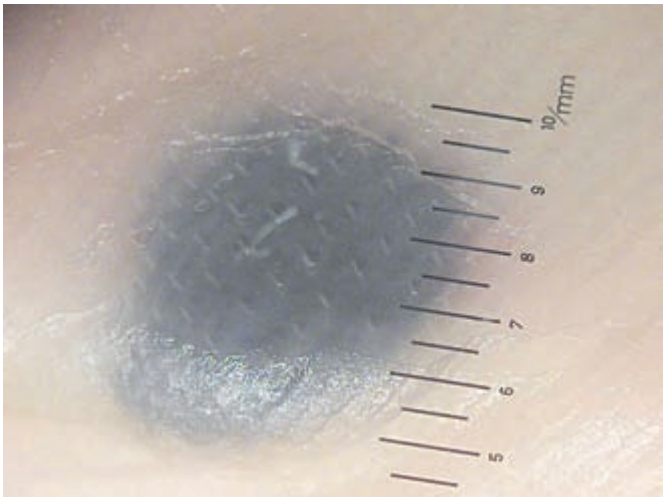

Figure 5. *Homogeneous pattern (dermoscopy).*

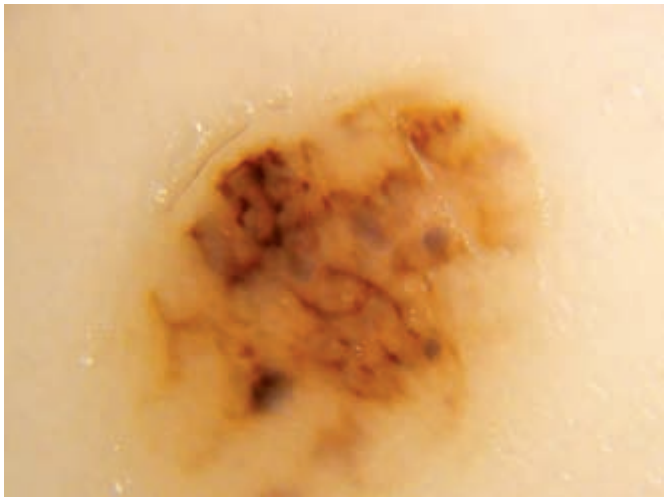

Figure 6. *Atypical pattern (dermoscopy).*

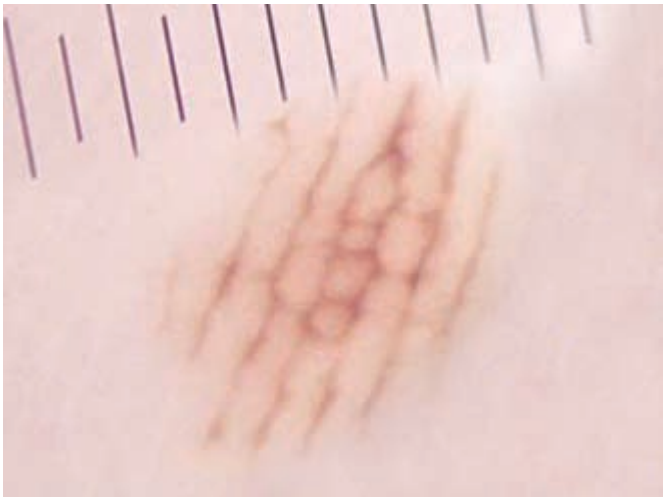

Figure 7. *Mixed pattern (dermoscopy).*

This induced the study in our setting (Hospital Privado) of acral dermoscopic patterns, their occurrence frequency, dermoscopic and histopathological correlation of palmoplantar nevi related to determination of benign vs. malignant patterns in the analyzed lesions; we also deemed it important to determine the degree of dermoscopic agreement between a research student and a dermoscopy-trained independent observer, in order to determine the researcher's training. This enables us to infer that this accessible method for trained dermatologists may be very useful in differential diagnosis of benign vs. malignant lesions.

Material and methods

An observational, prospective, cross-sectional, and analytical study was carried out in patients with clinical diagnosis of palmoplantar melanocytic nevi consulting the offices of the Dermatology Department of Hospital Privado de Córdoba, between May 2006 and April 2007, inclusive. Included were all patients of both sexes consulting spontaneously or referred with clinical diagnosis of palmoplantar nevi. Children under 10 years of age were excluded

Studied variables were: age, gender, related personal history, skin phototype, location, dermoscopic pattern, histologic pattern.

Every patient with palmoplantar melanocytic nevi was examined by the research physician and a dermoscopy-trained independent observer during the study period of time.

Each nevus was visualized with a dermatoscope (Heine Delta 10 brand, which magnifies the image 10 times), and a double protocol card was completed based on the above mentioned variables. Lesions on fingers, palms and soles were included; but not lesions on dorsal and subungual areas.

Digital images (cámara HP *Photosmart* R 707 5.1 MP) were taken before surgical procedure, and then digitalized in order to review clinical and dermoscopic features of each nevus.

Dermoscopic patterns of palm and sole nevi were categorized as parallel furrow, lattice-like, fibrillar or filamentous, globular, homogeneous, atypical, reticular, and parallel ridge pattern, according to the criteria established by Saida et al.[8,9] and Malvehy and Puig.[10] In clinical practice we found more than one dermoscopic pattern on the same lesion, therefore classification according to the above mentioned criteria was impossible; these cases were defined as mixed or combined patterns and were added to the former classification.

Histopathologic study was performed on all nevi by a dermatopathologist (sole observer) of the Pathology Department of the same hospital where the study was carried on.

Histologically, nevi were classified as: junctional, compound, dermal, displastic, blue, congenital, and combined nevus.

Palmoplantar nevi location was identified on: palm, fingers (hands and feet), interdigital (foot), internal lateral aspect of foot, external lateral aspect of foot, heel, and sole.

All digitalized lesions were independently examined by the research student and the independent observer, and categorized according to the predominant pattern.

For analysis, data were expressed as averages, with respective standard deviations for continuous variables, and as percentages with respective 95 percent confidence interval (95% CI) for nominal variables. Agreement on dermoscopic diagnosis was calculated by kappa value. A kappa value of 1.0 indicates perfect agreement, values above 0.75 are deemed excellent, values of 0.4 and 0.75 are deemed regular to good, and values below 0.4 are deemed poor. Statistical significance level was established at $p < 0.05$.

Results

Seventy four patients were examined, 54 (73 percent) females and 20 (27 percent) males, average age 32.5 years (25-42.25). History of non-melanoma skin cancer appeared in 2 (2.7 percent) patients, history of melanoma in 1 (1.4 percent) and no pathological history in 71 (95.9 percent).

Mainly skin phototype II was found (**Chart 1**). Of all patients, 61 (82.4 percent) knew about the lesion in that location, and 13 (17.6 percent) were unaware of it.

The study included 83 acral melanocytic nevi in 74 patients, whereof 79 lesions were excised. Of the total sample, 73 (88 percent) nevi were located on foot and 10 (12 percent), on hands (**Chart 2**).

Of the total of patients, 6 (75.9 percent) had only 1 nevus, 16 (19.3 percent) had 2 nevi, and 4 (4.8 percent) patients had 3 nevi. No lesion showed clinical signs of malignancy according to ABCD rule of dermoscopy (asymmetry, border, color and differential structures).

We identified the following dermoscopic patterns; the researcher student detected a parallel pattern (**Figure 1**) in 25 (30.1 percent) lesions, a lattice-like pattern (**Figure 2**) in 7 (8.4 percent), a fibrillar pattern (**Figure 3**) in 9 (10.8 percent), a globular pattern (**Figure 4**) in 6 (7.2 percent), a homogeneous pattern (**Figure 5**) in 4 (4.8 percent), reticular pattern in 1 (1.2 percent), atypical pattern (**Figure 6**) in 10 (12.0 percent) and mixed (**Figure 7**) in 21 (25.3 percent) lesions.

The independent observer found the following patterns: a parallel pattern in 26 (31.35) lesions, a lattice-like pattern in 7 (8.4 percent), a fibrillar pattern in 9 (10.8 percent), a globular pattern in 8 (9.6 percent), a homogeneous pattern in 4 (4,8 percent), a reticular pattern in 1 (1.2 percent), an atypical pattern in 10 (12.0 percent) and a mixed one in 18 (21.7 percent) (**Table 1** and **Chart 3**).

The dominant pattern in the different locations was parallel furrow patterns as shown in **Table 2** and **Chart 4**. Seventy nine lesions were excised for histopathology. All lesions were benign.

Most frequent was the compound histological pattern, representing 39 percent of the sample (**Chart 5**).

Distribution frequency of dermoscopic patterns and histopathological results are shown in **Table 3**.

Dermoscopic and histological correlation appear in **Table 4** and **Chart 6**.

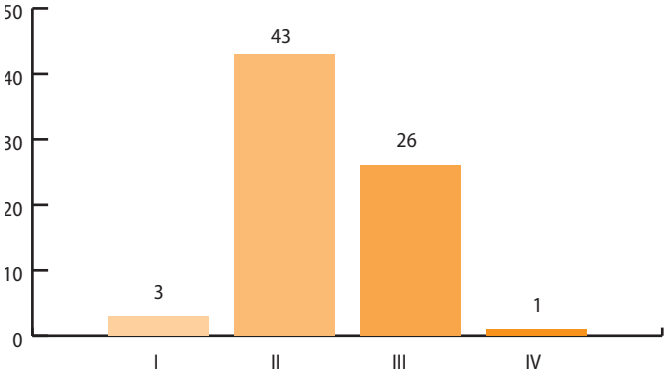

Chart 1. *Distribution according to phototypes.*

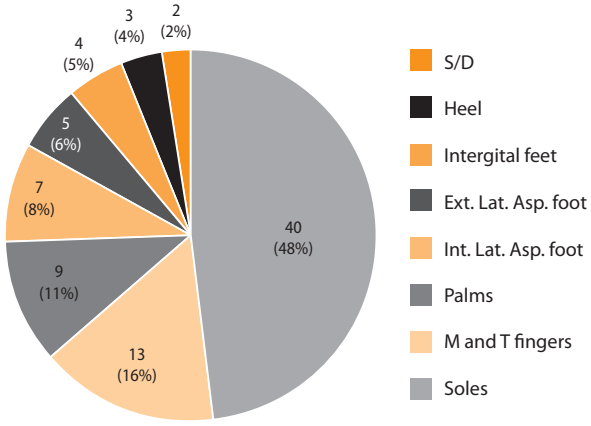

Chart 2. *Distribution according to location.*

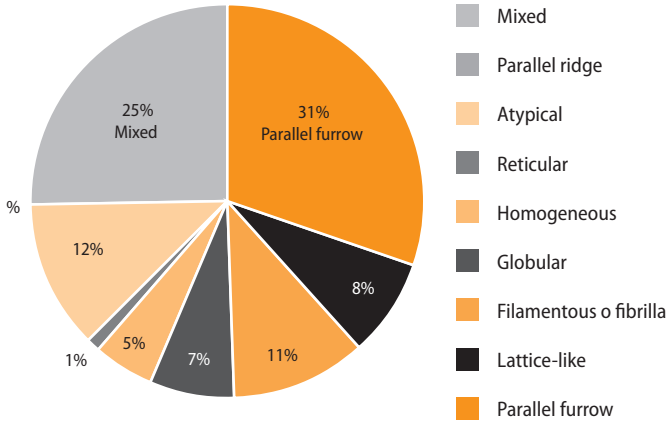

Chart 3. *Dermoscopic patterns distribution.*

Dermoscopic agreement between the researcher and the independent observer was excellent; kappa coefficient calculation resulted in 0.836, a statistically significant value with $p < 0.05$. No lesion showed parallel ridge pattern characteristic of malignancy or other features previously associated with acral melanoma (**Chart 7**).

TABLE 1A. DERMOSCOPIC PATTERN ACCORDING TO THE RESEARCHER.

Dermoscopic pattern	Frequency	%	Aggregated %
Parallel furrow	25	30.1	30.1
Lattice-like	7	8.4	38.6
Filamentous or fibrillar	9	10.8	49.4
Globular	6		7.2
Homogeneous	4	4.8	56.6
Reticular	1	1.2	61.4
Atypical	10	12.0	62.7
Mixed	21	25.3	74.7
Total	**83**	**100.0**	100.0

TABLE 1B. DERMOSCOPIC PATTERN ACCORDING TO THE OBSERVER.

Dermoscopic pattern	Frequency	%	Aggregated %
Parallel furrow	26	31.3	31.3
Lattice-like	7	8.4	39.8
Filamentous or fibrillar	9	10.8	50.6
Globular	8	9.6	60.2
Homogeneous	4	4.8	65.1
Reticular	1	1.2	66.3
Atypical	10	12.0	78.3
Mixed	18	21.7	100.0
Total	**83**	**100.0**	

TABLE 2. PATRONES DERMATOSCÓPICOS SEGÚN LOCALIZACIÓN.

Pattern	Hands					Foot										Total	% Total
	Palm	Fingers	Sub-total hand	Part. in hand	% hand	Fingers	Inter-digital	Internal lat. asp.	External lat. asp.	Heel	Sole	S/D	Sub-total foot	Part. in foot	% foot		
Parallel furrow	4	0	4	**40%**	**16%**	7	0	1	1	0	11	1	21	**29%**	**84**	**25**	**30%**
Lattice-like	1	0	1	**10%**	**14%**	0	0	0	0	0	6	0	6	**8%**	**86**	**7**	**8%**
Filamentous or fibrillar	0	0	0	**0%**	**0%**	1	0	0	0	3	5	0	9	**12%**	**100**	**9**	**11%**
Globular	0	0	0	**0%**	**0%**	0	0	0	1	0	4	1	6	**8%**	**100**	**6**	**7%**
Homoge-neous	0	0	0	**0%**	**0%**	2	1	1	0	0	0	0	4	**5%**	**100**	**4**	**5%**
Reticular	0	1	1	**10%**	**100%**	0	0	0	0	0	0	0	0	**0%**	**0**	**1**	**1%**
Atypical	3	0	3	**30%**	**30%**	0	0	2	2	0	3	0	7	**10%**	**70**	**10**	**12%**
Parallel ridge	0	0	0	**0%**	**0%**	0	0	0	0	0	0	0	0	**0%**	**0**	**0**	**0%**
Mixed	1	0	1	**10%**	**5%**	2	3	3	1	0	11	0	20	**27%**	**95**	**21**	**25%**
Total	**9**	**1**	**10**	**100%**	**12%**	**12**	**4**	**7**	**5**	**3**	**40**	**2**	**73**	**100%**	**88**	**83**	**100%**

TABLE 3. CORRELACIÓN DE LOS PATRONES DERMATOSCÓPICOS E HISTOPATOLÓGICOS.

Patterns	Lesions		Excised		Junctional	Compound	Dermal	Congenital	Displastic	Blue	Mixed	No nevus
	n = 83	%	n = 79	%								
Parallel rrowfu	25	30%	24	30%	6	11	1	0	1	0	1	4
Lattice-like	7	8%	6	8%	3	2	0	0	1	0	0	0
Filamentous bribarfi	9	11%	9	11%	3	2	1	0	3	0	0	0
Globular	6	7%	5	6%	0	1	2	0	0	0	1	1
Homogeneous	4	5%	4	5%	0	1	1	0	0	1	1	0
Reticular	1	1%	0	0%	0	0	0	0	0	0	0	0
Atypical	10	12%	10	13%	2	5	0	0	0	0	3	0
Parallel idge r	0	0%	0	0%	0	0	0	0	0	0	0	0
Mixed	21	25%	21	27%	5	9	3	0	1	0	1	2
					19	**31**	**8**	**0**	**6**	**1**	**7**	**7**

Discussion

In Caucasian population, acral melanoma represents 4.5 to 7 percent of melanomas, and prognosis is poorer for Caucasian patients with acral melanoma, compared to Japanese patients; this may be attributed to delay in diagnosis. Diagnosis of these lesions by visual examination may be difficult, even by expert dermatologists.

Therefore, a better way of characterizing acral melanocytic lesions may be very useful. Dermoscopy significatively improves diagnosis accuracy in melanocytic lesions and malignant melanomas.

Acrally located benign melanocytic lesions commonly found in the population may be difficult to differentiate clinically from early acral melanoma. Therefore, Saida et al.[11] recommended

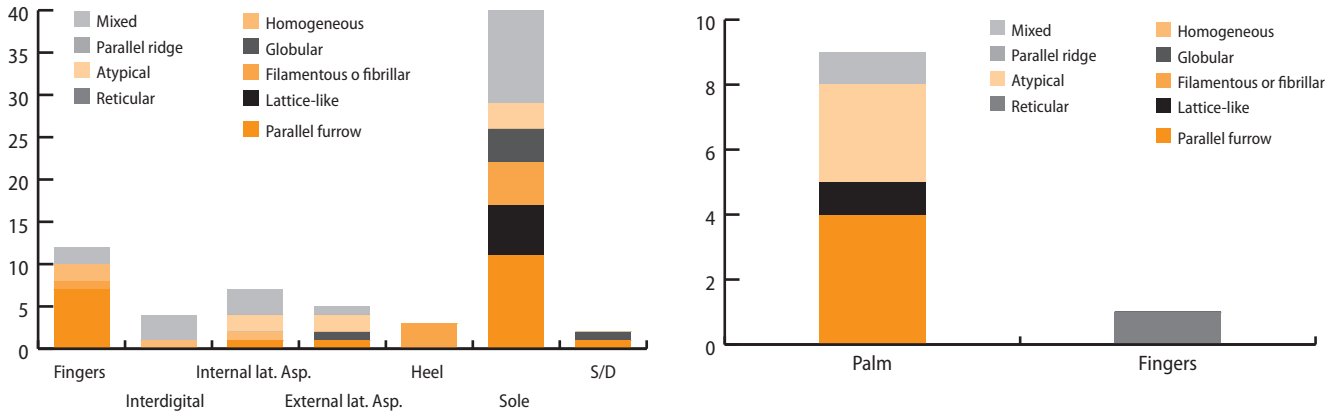

Chart 4. *Dermoscopic pattern distribution according to location.* ***Left:*** *pattern distribution in foot.* ***Right:*** *pattern distribution in hand.*

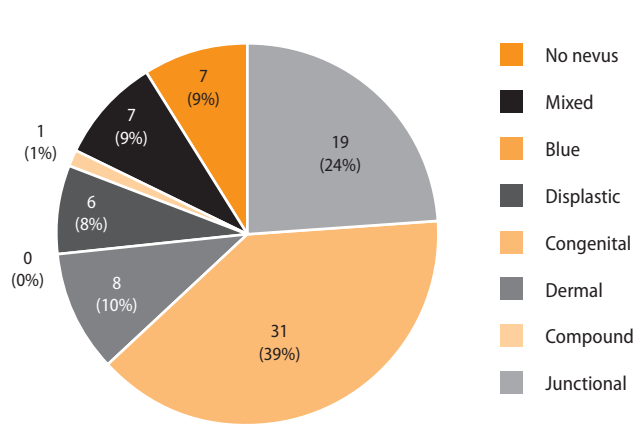

Chart 5. *Histological pattern distribution.*

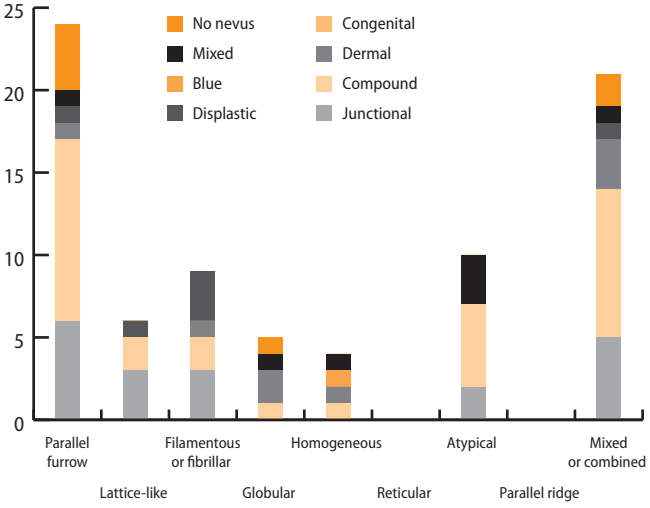

Chart 6. *Correlation of dermoscopic and histological patterns.*

excision of any acquired melanocytic lesion larger than 7 mm in diameter in hairless skin, and additionally described four dermoscopic patterns for acral melanocytic nevi:

- *parallel furrow pattern*, wherein pigmentation predominantly follows dermatoglyph furrows;
- *lattice-like*, where pigmentation follows the furrow, and lineal pigment bands transversely cross from one furrow to the next;
- *fibrillar*, consisting of numerous very fine or filamentous lines obliquely or perpendicularly crossing dermatoglyphs (ridges and furrows);
- *atypical*, consisting of lesions which cannot be assigned to the former groups.

Subsequently, three additional patterns were described:[10,12]

- *globular pattern*, defined as brown aggregated globules independent of dermatoglyphs (no presence of parallel pattern);
- *homogeneous pattern*, light brown pigmentation homogeneously diffusing on the skin surface;
- *acral reticulate*, consisting of a well-defined light or dark brown pigmented reticulate, differing from lattice-like pattern in that lines and distribution are independent of dermatoglyphs.[12]

TABLE 4. RESEARCHER DERMOSCOPIC PATTERN–OBSERVER DERMOSCOPIC PATTERN. CONTINGENCY TABLE.

		Dermoscopic pattern acc. observer								Total
		1	2	3	4	5	6	7	9	
Dermoscopic pattern acc. researcher	1	24	1	0	0	0	0	0	0	25
	2	1	5	0	0	0	0	0	1	7
	3	0	0	8	0	0	0	0	1	9
	4	0	0	0	6	0	0	0	0	6
	5	0	0	0	0	4	0	0	0	4
	6	0	0	0	0	0	1	0	0	1
	7	0	0	0	0	0	0	9	1	10
	9	1	1	1	2	0	0	1	15	21
Total		26	7	9	8	4	1	10	18	83

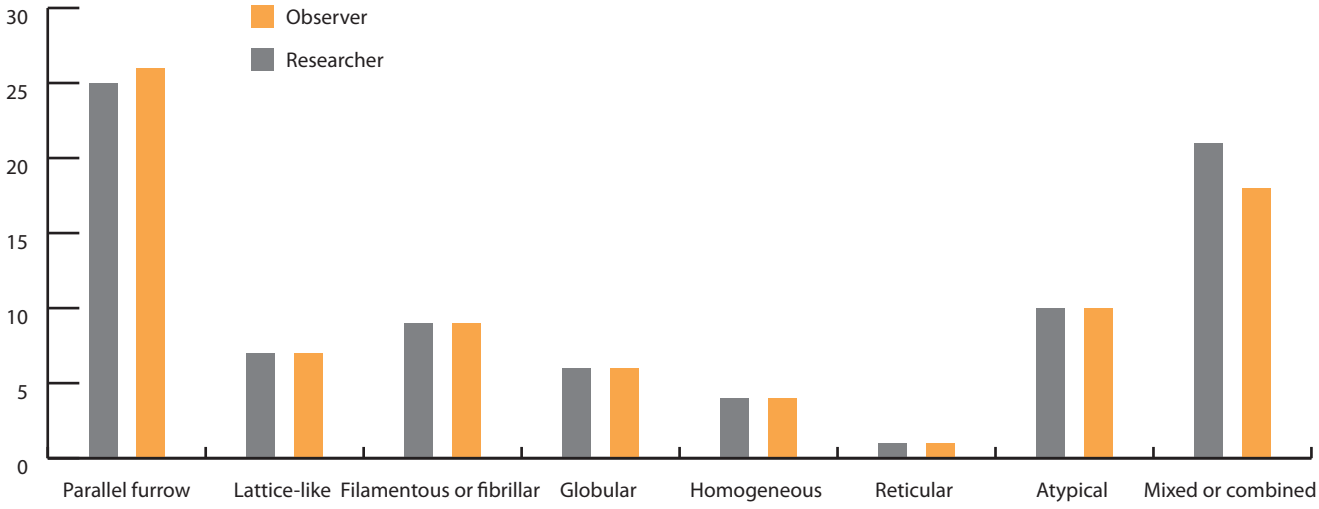

Chart 7. *Dermoscopic agreement between student researcher and trained observer.*

More specific identification of benign dermoscopic patterns should prevent unnecessary palm and sole surgeries;[13,14] this led us to carry out this work, both to understand method suitability and dermoscopic and histologic correlation, and dermoscopic agreement between the in-training and the expert observer. In this sense, it was very useful to demonstrate that the method, provided the availability of a device of accessible cost, may reduce morbidity of patients with acral nevi; and method training is relatively simple if taught by an expert.

Dermoscopic aspects of lesions located on hairless skin differ from those appearing on hairy skin, due to the different epidermal structures in these two anatomic sites.

The dermoscopic classification of acral benign melanocytic lesions proposed by Saida et al.[8] has been widely acknowledged as simple and highly reproducible in clinical practice.

The main purpose of our study was to investigate dermoscopic features of 83 acral melanocytic nevi in Caucasian population, their relation with structure, and the degree of agreement between observers.

We found that parallel furrow pattern was the most common dermoscopic pattern (31 percent), where other authors have found the following ratios: 44 percent,[8] 42 percent,[5] 42.1 percent[12] and 52.9 percent;[10] followed by mixed or combined patterns (25 percent), atypical (12 percent), fibrillar (11 percent), lattice-like (8 percent), globular (7 percent), homogeneous (5 percent) and reticular (1 percent), in coincidence with the Italian population, except a greater frequency of lattice-like pattern presentation in the latter. In comparison with other reports (Japanese population), we found a lower frequency of all patterns; this may be attributed to the presence in our study of a high percentage of mixed or combined pattern, which was not reported by other studies. None of the 83 lesions had the characteristic malignant parallel ridge pattern. A noteworthy finding is the presence of fibrillar pattern in pressure areas such as the sole and the heel, a condition reported by Altamira et al.[12] In our series, the fibrillar pattern was more frequent in soles than in palms, in coincidence with the reviewed literature.[10]

With reference to histopathological type, we found the following distribution: firstly, compound nevi (39 percent), followed by junctional nevi (24 percent), dermal nevi (10 percent), combined (9 percent), not nevi (9 percent), and displastic (8 percent). Most frequent histologic pattern was compound nevi; this pattern represents 39 percent of the sample, as found in other studies on Caucasian population.[10,12] Noteworthy is the presence of fibrillar pattern associated with displastic nevus (3 of 6).

Further studies are necessary to clarify the management of lesions with this pattern.

Dermoscopic agreement between the researcher and the independent observer (**Table 4**) was verified in parallel pattern in 24 of 26 lesions, in lattice-like pattern in 5 of 7 lesions, fibrillar pattern in 8 of 9 lesions, globular pattern in 6 of 6 lesions, homogeneous pattern in 5 of 5 lesions, reticular pattern in 1 of 1 lesion, atypical pattern in 9 of 10 lesions and mixed pattern in 15 of 21 lesions. Agreement results were excellent (kappa = 0.836) and statistically significant ($p < 0.05$).

Conclusion

Dermoscopic patterns found in our study coincide with the literature, except in the mixed or combined pattern concept (defined as the finding of more than one dermoscopic pattern in one lesion), which was not described in previous reports.

The most frequent dermosopic pattern in our series was parallel furrow pattern, and the histological type found in highest percentage was compound nevus, in coincidence with the reviewed literature.

Dermoscopic agreement between the researcher student and the dermoscopy-trained independent observer was excellent.

We highlight the significance of the dermatologist understan-

ding the dermoscopy technique, which may contribute to improve the cost-benefit relation of the surgical excision of plantopalmar melanocytic nevi which dermatologically do not suggest malignancy. It may be considered an intermediate step between clinical dermatology and dermopathology; Its use may increase sensibility and specificity in diagnosis of skin lesions.

We must understand dermoscopy as a new morphological dimension in exploring skin lesions, which allows the adjustment of *in vivo* diagnosis, but that this diagnosis accuracy highly depends on the expertise and training of the observer.

References

1. Cabrera H, García S. Generalidades. Parte I, Nevos. Editorial Actualizaciones Médicas 1998:3-4.
2. Grichnik JM, Rhodes AR, Sober AJ. Hiperplasias y neoplasias de los melanocitos. In: Freeberg I, Eisen A, Wolf K y cols. Fitzpatrick: Dermatología en Medicina General. Argentina: Editorial Médica Panamericana; 2005 tomo II: 989-1016.
3. Kowalczuk AM, Galimberti RL, Vasconcelos M, Cabarcas F y cols. Dermatoscopía de lesiones pigmentadas palmoplantares. Dermatol Argent 2005; 11:169-175.
4. Braun RP, Rabinovitz HS, Oliviero M, Kopf AW, et al. Dermoscopy of pigmented skin lesions. J Am Acad Dermatol 2005; 52:109-121.
5. Saida T, Oguchi S, Miyazaki A. Dermoscopy for acral pigmented lesions. Clin Dermatol 2002; 20:279-285.
6. Marghoob A, Swindle LD, Moricz CZ, Sánchez Negron FA, et al. Instruments and new technologies for the in vivo diagnosis of melanoma J Am Acad Dermatol 2003; 49:777-797.
7. Miyazaki A, Saida T, Koga H, Oguchi S, et al. Anatomical and dermoscopic patterns seen in melanocytic nevi on the soles: a retrospective study. J Am Acad Dermatol 2005; 53:230-236.
8. Saida T, Oguchi S, Ishihara Y. In vivo observation of magnified features of pigmented lesions on volar skin using video macroscope. Usefulness of epiluminescence techniques in clinical diagnosis. Arch Dermatol 1995; 131:298-304.
9. Saida T, Mijazaki A, Oguchi S, Ishihara Y, et al. Significance of dermatoscopic patterns in detecting malignant melanoma on acral volar skin. Arch Dermatol 2004; 140:1233-1238.
10. Malvehy J, Puig S. Dermatoscopic patterns of benign volar melanocytic lesions in patients with atypical mole syndrome. Arch Dermatol 2004; 140:538-544.
11. Saida T, Yoshida N, Ikegawa S, Ishihara K, et al. Clinical guidelines for the early detection of plantar malignant melanoma. J Am Acad Dermatol 1990; 23:37-40.
12. Altamura D, Altobelli E, Micantonio T, Piccolo D, et al. Dermoscopic patterns of acral melanocytic nevi and melanomas in a white population in Central Italy. Arch Dermatol 2006; 142:1123-1128.
13. Kuchelmeister C, Schaumburg Lever G, Garbe C. Acral cutaneous melanoma in Caucasians: clinical features, histopathology and prognosis en 112 patients. Br J Dermatol 2000; 143:275-280.
14. Kukita A, Ishihara K. Clinical features and distribution of malignant melanoma and pigmented nevi on the soles of the feet in Japan. J Invest Dermatol 1989; 92:210S-213S.