Proposal of a new dermoscopic criterion for pigmented basal cell carcinoma: a multicentre retrospective study

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Abstract

Dermoscopy is widely used for the diagnosis of skin cancer and it increases the accuracy of basal cell carcinoma (BCC) detection. BCC dermoscopic criteria have been updated and divided into vascular, pigment-related, and non-vascular/non-pigment-related. Our multicenter retrospective study tested a new dermoscopic pigment-related characteristic to detect pigmented BCC (pBCC) [brown homogeneous blotches (BHB)]. Cases of pBCC were collected from the databases of IDI-IRCCS of Rome and from three Italian private dermatology centers. BHB are confined patches of brown uniform pigmentation without dermoscopic features (net, fat fingers, *etc*.) or other internal dermoscopic structures, except for occasional vascular ones like arborizing vessels or globules/dots. Melanocytic and non-melanocytic controls were used. We reviewed photos of 270 pigmented lesions (female 145; 51.8%), including 90 histopathologically verified pBCC and 180 control cases (90 melanocytic and 90 non-melanocytic). BHB were found in 61 cases of 90 pBCC patients. The results showed a 67.8 sensitivity, 93.3 specificity, 83.6 positive and 85.3 negative predictive values, posLR 10.2, negLR 0.3, odds ratio 29.4, p<0.001. Our multicentre retrospective analysis suggested the BHB may be a novel dermoscopic pBCC diagnosis criterion.

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Introduction

Basal cell carcinoma (BCC) is the most frequent malignant skin tumor with steadily increasing incidence worldwide.[1] BCC is classified among the non-melanoma skin cancers, keratinocytes tumors characterized by an estimated incidence 18-20 times higher than that of melanoma.[1] The reported incidence rate of BCC in Europe is 129.3 in men, and 90.8 in women, per 100,000 person-years.[2-4] BCC is characterized by several clinical forms such as nodular, ulcerative, superficial, morpheaform, and pigmented BCC (pBCC).[1-5] This latter form constitutes 10% and 60% of all BCC in the Caucasian and Asian populations, respectively.[4] Dermoscopy may improve BCC diagnostic accuracy up to 98.6% in sensitivity and 95% in specificity.[5,6] The dermoscopic features of BCC were first described by Menzies *et al.* in 2000.[7,8] Dermoscopic criteria for BCC have been refined over the years and they could be divided into three categories: vascular, pigment-related, and nonvascular/non-pigment-related.[1,6,9] Vascular structures include arborizing vessels and short fine telangiectasias. Structures related to pigment are maple leaf-like areas, spoke-wheel areas, multiple blue-grey globules, in-focus dots, blue-grey ovoid nests and concentric structures.[10-13] Other structures, such as ulcerations, multiple small erosions, shiny white-red structureless areas and white streaks (chrysalis) can be classified as nonvascular/non-pigmented structures. Pigment-related criteria such as maple leaf-like areas, spoke-wheel areas, and concentric structures represent specific arrangements not always detectable in pBCC (*i.e.*, with low sensitivity).[5] Almost 30% of BCCs that are clinically classified as non-pigmented reveal pigmented structures under dermoscopy, and it is currently accepted that pigment features may be found in all BCC subtypes, both superficial and non-superficial.[14]

The idea that inspired our study was to identify a simplified, non-figurative, pigment-related, dermoscopic criterion for the diagnosis of pBCC, with higher sensitivity compared to presently figurative pigmented accepted criteria, and with adequate diag-

nostic accuracy. When examining a number of pBCCs, we observed some brown homogeneous blotches (BHB) (Figures 1-3), with a high variability in number, size, and distribution.[15] These BHB are circumscribed areas with an overall amorphous appearance. In fact, they are devoid of any dermoscopic specific arrangement (net, fat fingers, *etc*.) and of other internal dermoscopic structures, except for occasional vascular ones, such as arborizing vessels or globules/dots.

The aim of our multicentre retrospective study was to evaluate the potential of the BHB as a new dermoscopic criterion for the diagnosis of pBCC.

Materials and Methods

Cases of pBCC were collected from the databases of IDI-IRCCS of Rome and from three Italian private dermatology practices. We included only BCCs with dermoscopic features that highlight pigmentation and we selected only high-resolution dermoscopic images. Two of us (LF and MC) evaluated each dermoscopic image for the presence of standard pBCC criteria and for the presence of the new proposed feature, which we named BHB. Evaluations were performed in a blinded fashion, in that both evaluators at the time of dermoscopic examination were, of course, unaware of the final histopatological diagnosis. The standard pBCC criteria and the new feature were scored based on the

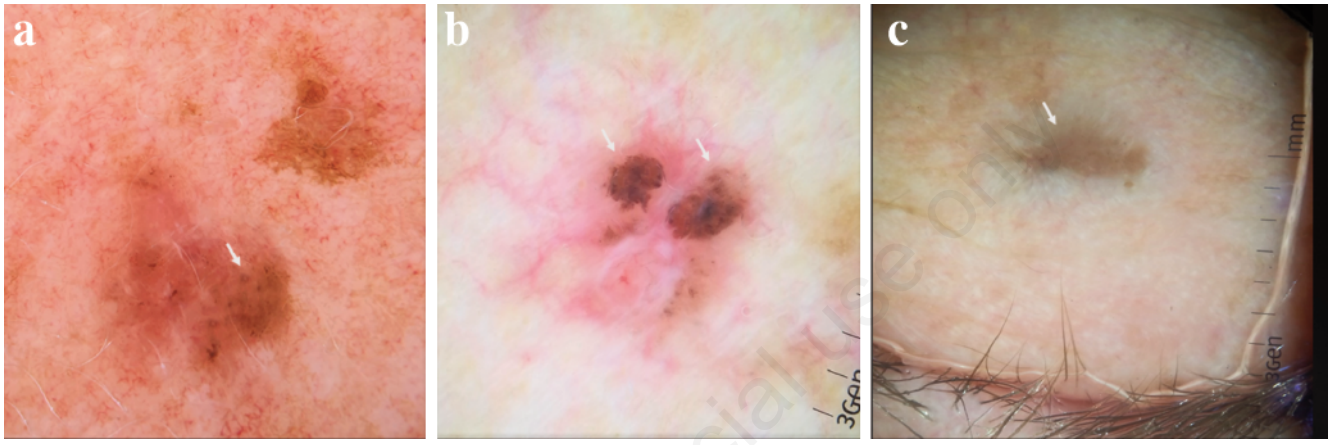

Figure 1. The brown homogeneous blotches represent a new simplified (not figurative) pigment-related criterion for diagnosis of the pigmented basal cell carcinoma. Lesions (**a**) and (**b**) are associated with red-white structureless areas and fine teleangectasias; lesion (**c**) is associated with some peripheral chrysalis structures.

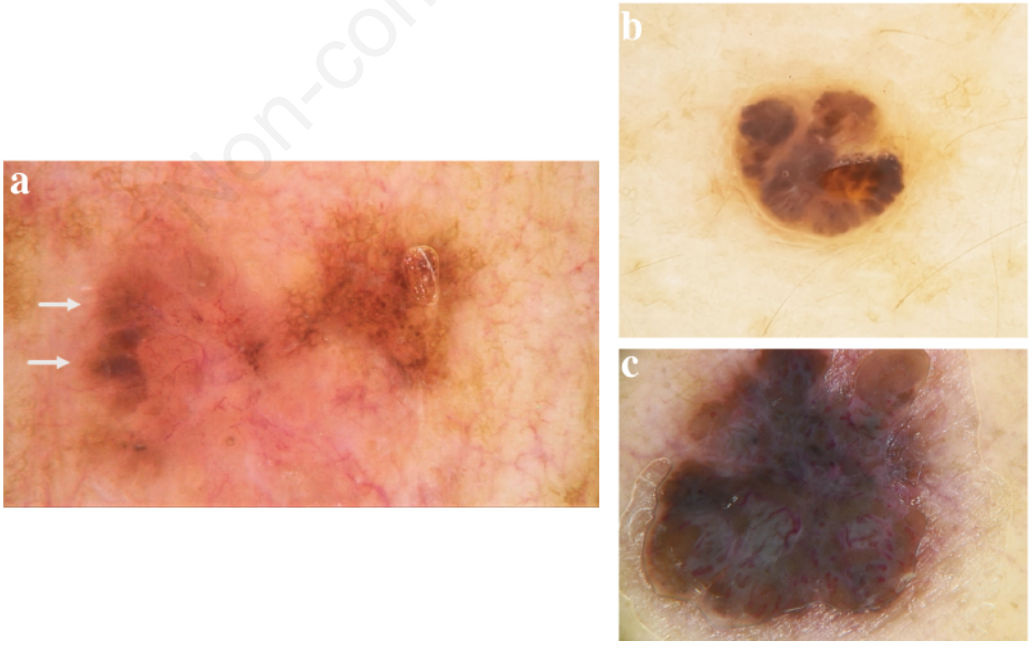

Figure 2. The brown homogeneous blotches are variable in number, size and distribution. Lesion (**a**) presents a few peripheral blotches with light brown pigmentation. In lesion (**b**) there are many disseminated blotches with marked pigmentation. Lesion (**c**) is entirely occupied by extended brown homogeneous blotches.

agreement of the two observers. When no agreement was achieved by the two clinicians, a third observer (RM) was consulted.

The new feature was defined as the presence of circumscribed areas of BHB. Classical pBCC criteria scored in our study were the following: arborizing vessels, short fine telangiectasias, in-focus dots, multiple blue-grey globules, blue-grey ovoid nests, concentric structures, maple leaf-like areas, spoke-wheel areas, ulcerations, multiple small erosions, shiny white-red structureless areas and white streaks (chrysalis). Controls included melanocytic and non-melanocytic lesions that are typically included in the differential diagnosis of pBCC, such as composite nevi, dermal nevi, melanomas, seborrheic keratoses, solar lentigo, and pigmented actinic keratoses. We excluded junctional nevi because the net, as unique feature present in a lesion, is not a challenge for diagnosis of pBCC. We also excluded infiltrating SCC, as it constitutes a challenge for the diagnosis of BCC but not for pBCC.

All dermoscopic images were captured with a Nikon camera, using Dermlite IV in polarized and non-polarized modes, with digital videodermoscopy (Fotofinder). Patient age and sex, and site of lesion, were collected in an electronic data sheet.

Results

We examined images of 270 pigmented lesions (145 females; 51.8%). The mean patient age was 61.3 years (range 29-88; age not available in 6 patients). Lesions were located on the trunk (N=131), head/neck (N=71), lower extremities (N=25), upper extremities (N=38); information on body site was not available in five lesions. Our retrospective study included 90 histopathologically proven pBCC and 180 control cases of which 90 melanocytic and 90 non-melanocytic lesions. Melanocytic lesions included dermal nevi (N=25), composite nevi (N=25), dysplastic nevi (N=20), melanomas (N=20). Non-melanocytic lesions included seborrheic keratosis (N=35), solar lentigo (N=35), and pigmented actinic keratosis (N=20).

BHB were present in 61 pBCC cases [sensitivity 67.8%, specificity 93.3%, positive predictive value 83.6%, negative predictive value 85.3%, likelihood ratio for a positive test result (posLR) 10.2, negative likelihood ratio (negLR) 0.3; odds ratio 29.4, P<0.001]. The relevant values observed for the other traditional dermoscopic criteria for pBCC are summarized in Table 1.

Table 1 includes the dermoscopic criteria for the 90 melanocytic and 90 non-melanocytic lesions, considered as control group. BHB were seen in 12 lesions (6.7%).

Discussion

In our study, in which we compared dermoscopic features of pBCC to those of other relevant skin lesions, we observed that BHB have sensitivity and specificity values comparable to those of well-accepted dermoscopic criteria for the diagnosis of pBCC.

Therefore, we propose BHB, defined as circumscribed areas of homogeneous pigmentation, as a useful new dermoscopic criterion for the diagnosis of pBCC.

Dermoscopy is a widely used non-invasive diagnostic technique that improves the diagnostic accuracy for skin cancer lesions in comparison with examination with the unaided eye.[16,17]

The diagnostic accuracy of both types of BCC, pigmented and non-pigmented, is significantly increased by many dermoscopic criteria, as reported before.[5,8,18] Since the first dermoscopy consensus meeting in 1990 in Hamburg, arborizing vessels have been described as the main structure in BCC, with a high diagnostic

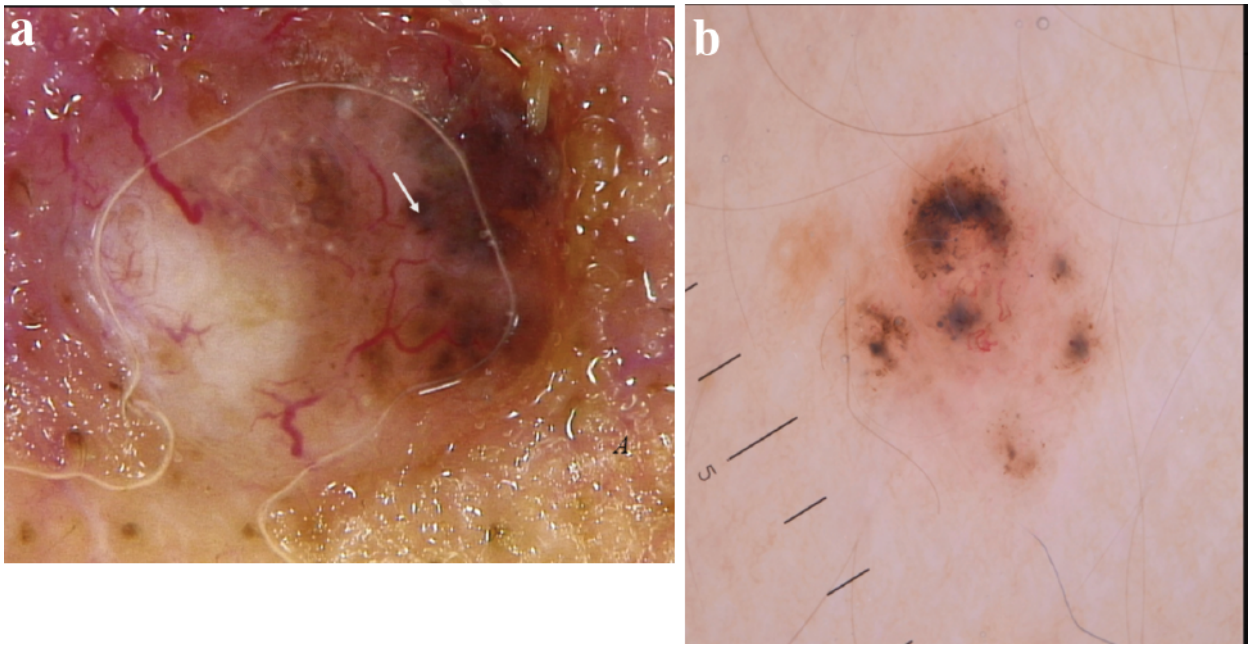

Figure 3. The brown homogeneous blotches are devoid of any dermoscopic specific arrangement (net, fat fingers, etc.) and of the other dermoscopic structures inside, except for vascular ones [arborizing vessels, lesion (a)] and globules/dots sometimes [lesion (b)]; so showing an overall amorphous appearance.

Table 1. Pattern analysis of pigmented basal cell carcinoma lesions, control group and statistical analysis.

Criteria:	pBCC Present	pBCC Absent	pBCC %	nonpBCC Present	nonpBCC Absent	nonpBCC %	Sensitivity	Specificity	PPV	NPV	LR+	LR-	OR (95% CI)
Vascular structures													
Arborizing vessels	44	46	48.9	5	175	2.8	48.9	97.2	89.8	79.2	17.6	0.5	32.9 (13.1-98.5)
Short fine teleangectasias	39	51	43.3	32	148	17.8	43.3	82.2	54.9	74.4	2.4	0.7	3.5 (2.0-6.2)
Structures related to pigment													
In-focus dots	33	57	36.7	34	146	18.9	36.7	81.1	49.3	71.9	1.9	0.8	2.5 (1.4-4.4)
Multiple blue-grey globules	38	52	42.2	41	139	22.8	42.2	77.2	48.1	72.8	1.9	0.7	2.5 (1.4-4.3)
Blue-grey ovoid nests	26	64	28.9	11	169	6.1	28.9	93.9	70.3	72.5	4.7	0.8	6.2 (2.9-13.8)
Brown homogeneous blotches	61	29	67.8	12	168	6.7	67.8	93.3	83.6	85.3	10.2	0.3	29.4 (14.2-61.3)
Concentric structures	19	71	21.1	9	171	5.0	21.1	95.0	67.9	70.7	4.2	0.8	5.1 (2.2-12.2)
Maple leaf like areas	29	61	32.2	14	166	7.8	32.2	92.2	67.4	73.1	4.1	0.7	5.6 (2.8-11.6)
Spoke wheel areas	6	84	6.7	3	177	1.7	6.7	98.3	66.7	67.8	4.0	0.9	4.2 (1.02-20.9)
Non-vascular/non-pigment-related													
Ulceration	22	68	24.4	9	171	5.0	24.4	95.0	71.0	71.5	4.9	0.8	6.1 (2.7-14.0)
Multiple small erosions	25	65	27.8	12	168	6.7	27.8	93.3	67.6	72.1	4.2	0.8	5.4 (2.6-11.4)
Shiny white-red structureless areas	45	45	50.0	24	156	13.3	50.0	86.7	65.2	77.6	3.8	0.6	6.5 (3.6-11.8)
White streaks (chrysalis)	29	61	32.2	18	162	10.0	32.2	90.0	61.7	72.6	3.2	0.8	4.3 (2.2-8.3)

PBCC, pigmented basal cell carcinoma; PPV, positive predictive value; NPV, negative predictive value; LR+, positive likelihood ratio; LR-, negative likelihood ratio; OR, odds ratio; CI, confidence interval.

accuracy and a positive predictive value of 94.1%.[19] Its use increases diagnostic accuracy between 5% and 30% over clinical visual inspection, depending on the type of skin lesion and experience of the physician. Dermoscopic imaging has improved diagnostic accuracy; however, diagnosis of non-pigmented BCC remains limited to arborizing vessels, ulceration, and shiny white structures.[7] Spoke-wheel areas, which are radial projections converging at a darker central point and maple leaf-like areas are highly specific for pBCC,[2,12-14] but these are not frequent in dermoscopic practice (low sensitivity).

Evaluating a number of pBCC, we observed formations that could be described as BHB, highly variable in number, size, and distribution, and we wondered whether they could be considered as new dermoscopic criteria. This new feature shows a morphology not comparable with other pigmented dermoscopic criteria. In particular, blu-gray ovoid nests have a different chromatic appearance and different aspect because are sharp-ovalar areas (larger than globules) while BHB are very variable in shape and size.

Conclusions

In our study, we highlight that our proposed new criterion showed a sensitivity of 67.8% and a specificity 93.3%. BHB in comparison with classical figured pigmented criteria (*i.e.*, concentric structures, spoke-weel areas, maple leaf-like areas, *etc.*) showed similar specificity but much higher sensitivity (*i.e.*, concentric structures show sensitivity 21.1%, spoke wheel areas 6.7% maple leaf-like areas 32.2%). Our study has some limitations because all lesions do not represent a consecutive sample in a given period of outpatient visits, but we have retrospectively selected groups of different lesions to test the new dermoscopic feature. However, the selection of lesions among the different subgroups was random, and not subject to the observers' preferences.

Dermoscopy always offers new challenges and new opportunities.[20] Our study preliminarily shows the potential usefulness of a new dermoscopic criterion in such a relevant condition as pBCC. Our new specific dermoscopic criterion for the diagnosis of pBCC may complement other established dermoscopic criteria, thus contributing to increase the accuracy of the diagnosis of the most frequent skin cancer. Our findings will have to be confirmed in more in-depth studies in different settings and on different populations, possibly contemplating complex indexes that simultaneously include different criteria.

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