Interobserver Agreement on Dermoscopic Features of Pigmented Basal Cell Carcinoma

KETTY PERIS, MD,* EMMA ALTOBELLI, MD,† ANGELA FERRARI, MD,* MARIA CONCETTA FARGNOLI, MD,* DOMENICO PICCOLO, MD,* MARIA ESPOSITO, MD,‡ AND SERGIO CHIMENTI, MD‡

*Departments of *Dermatology and †Internal Medicine and Public Health, University of L'Aquila, L'Aquila, Italy, and ‡Department of Dermatology, University of Rome "Tor Vergata", Rome, Italy*

BACKGROUND. **A dermoscopic method based on the absence of a pigment network and the presence of at least one of six positive features has been described for diagnosis of pigmented basal cell carcinoma (BCC).**

OBJECTIVE. **To evaluate the observers' global agreement and interobserver agreement on each dermoscopic parameter of the method recently proposed.**

METHODS. **Dermoscopic images of 56 pigmented BCCs were examined by five observers with different degrees of experience in dermoscopy.**

RESULTS. **An overall full agreement was reached for the absence of pigment network ($k = 1$). Very good agreement was detected for the presence of spoke wheel areas ($k = 0.85$) and arborizing vessels ($k = 0.72$), and good agreement was shown for ulceration ($k = 0.49$) and multiple blue-gray globules ($k = 0.41$). No agreement was identified on large blue-gray ovoid nests ($k = 0.28$) and leaflike areas ($k = 0.26$).**

CONCLUSION. **We confirm the reproducibility of the method and show that ulceration, spoke wheel areas, and arborizing telangiectases represent the most robust positive parameters.**

K. PERIS, MD, E. ALTOBELLI, MD, A. FERRARI, MD, M. C. FARGNOLI, MD, D. PICCOLO, MD, M. ESPOSITO, MD, AND S. CHIMENTI, MD HAVE INDICATED NO SIGNIFICANT INTEREST WITH COMMERCIAL SUPPORTERS.

DERMOSCOPY IS a noninvasive technique that is known to increase the diagnostic accuracy of benign versus malignant pigmented skin lesions.[1–6] Basal cell carcinoma (BCC) is a locally invasive, cutaneous, malignant epithelial tumor whose clinical differential diagnosis with squamous cell carcinoma (SCC), keratoacanthoma, and melanoma is difficult in some cases. The dermoscopic characteristic criteria for the diagnosis of BCC include prominent telangiectases of different diameter and numerous branches (so-called arborizing vessels), and leaflike areas showing an opaque gray-brown to slight gray pigmentation, mainly located at the periphery of the lesion. In addition, gray dots/globules and irregularly outlined gray structures may be detected.[1–3,7,8]

Menzies et al.[9] recently proposed a simple dermoscopic model for the diagnosis of pigmented BCC, based on the absence of a pigment network and the presence of at least one of six positive morphologic features. Positive dermoscopic features include ulceration, not associated with a recent history of trauma, multiple blue-gray globules, leaflike areas, and telangiectasia. Furthermore, large blue-gray ovoid nests have been defined as pigmented ovoid or elongated areas, larger than globules and not intimately connected to the pigmented tumor body. Spoke wheel areas are an additional parameter appearing as well-circumscribed radial projections, usually tan, but also blue or gray, meeting at an often darker (dark brown, black, or blue) central axis.[9]

We examined 56 pigmented BCCs to evaluate global agreement of five observers with different degrees of dermoscopic experience and pairwise agreement on each dermoscopic parameter included in the diagnostic method proposed by Menzies et al.[9]

Materials and Methods

Dermoscopic examination was performed by five observers with different degrees of dermoscopic experience, without knowledge of the histopathologic diagnosis. The degree of dermoscopic experience was assessed by a score evaluating the number of years specializing in dermoscopy (score: 1, 0–1 year; 2, 2–5 years; 3, >5 years), the number of pigmented skin lesions assessed by dermoscopy on a daily basis (1,<10 lesions/day; 2, 11–20 lesions; 3, 21–30 lesions; 4, >30 lesions), the number of workshops/seminars attended (1, 0–1 workshops/seminars; 2, 2–5 workshops/seminars; 3, >5 workshops/seminars), and the number of dermoscopy publications authored (1, 0–1 publications; 2, 2–5 publications; 3, 6–10 publications; 4, >10 publications). On the basis of these criteria, observers were divided into three groups: min-

Address correspondence and reprint requests to: Ketty Peris, MD, Department of Dermatology, University of L'Aquila, Via Vetoio – Coppito 2, 67100 L'Aquila, Italy, or e-mail: telederm@univaq.it.

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imally experienced (total score 4–6), moderately experienced (total score 7–11), and highly experienced (total score >11). Dermoscopic analysis was performed using a DEMMIPS (Digital Epi Microscopy Melanoma Image Processing Software; Biomips S.R.L., Siena, Italy) system consisting of a stereomicroscope with 6×–40× magnification, a high-resolution video camera, and a personal computer with a Pentium 120 MHz processor with 16 MB RAM and a high-resolution 20-inch color monitor.

A dermatologist who was not a study participant retrieved digital dermoscopic images from all of the pigmented BCCs (56 pigmented BCC lesions from 48 patients) included in our database. Patients included 26 men and 22 women, age 38–85 years (mean 60 years ± 14 SD). Multiple BCCs were present in 5 of 48 patients. The BCC lesions were classified clinically as superficial (23), nodular (13), and nodulo-ulcerative (20), and the sites of the lesions were the trunk (26), face (23), head (3), lower extremities (3), and right arm (1). The size of individual lesions ranged from 3 to 45 mm (mean 11.6 mm ± 8.2 SD). In all cases the diagnosis was confirmed by histopathologic examination. The negative and positive dermoscopic criteria for the diagnosis of pigmented BCCs are listed in Table 1. Examples of positive dermoscopic features are illustrated in Figure 1.

Global agreement and pairwise interobserver agreement on the dermoscopic criteria were estimated using Cohen's kappa statistic, with $k \geq 0.40$ indicating good agreement.[10] Cohen's kappa statistic provides the degree of agreement beyond chance. In fact, a low agreement is better than casualness and there is no need to test the null hypothesis in the absence of agreement.[10] Statistical analysis was performed using SAS/STAT software (SAS Institute, Cary, NC).[11]

Results

The five observers were classified on the basis of their dermoscopic experience as follows: highly experienced in dermoscopy, three observers (A, B, and D); moderately experienced, one observer (C); and minimally experienced, one observer (E). Table 2 summarizes global and pairwise agreement for each of the dermoscopic criteria for diagnosis of pigmented BCCs. Our data showed that full agreement was achieved for the absence of a pigment network ($k = 1$) and very good global agreement was achieved for the presence of spoke wheel areas ($k = 0.85$) and arborizing vessels ($k = 0.72$). In addition, good global agreement was achieved for ulceration ($k = 0.49$) and for multiple blue-gray globules ($k = 0.41$). In contrast, no global agreement was identified on large blue-gray ovoid nests ($k = 0.28$) and leaflike areas ($k = 0.26$). With pairwise interob-

Table 1. Dermoscopic Features for Diagnosis of Pigmented BCC as Proposed by Menzies et al.[9]

Negative feature
Pigment network
Positive features
Ulceration
Large blue-gray ovoid nests
Multiple blue-gray globules
Maple leaflike areas
Spoke wheel areas
Arborizing (treelike) telangiectasia

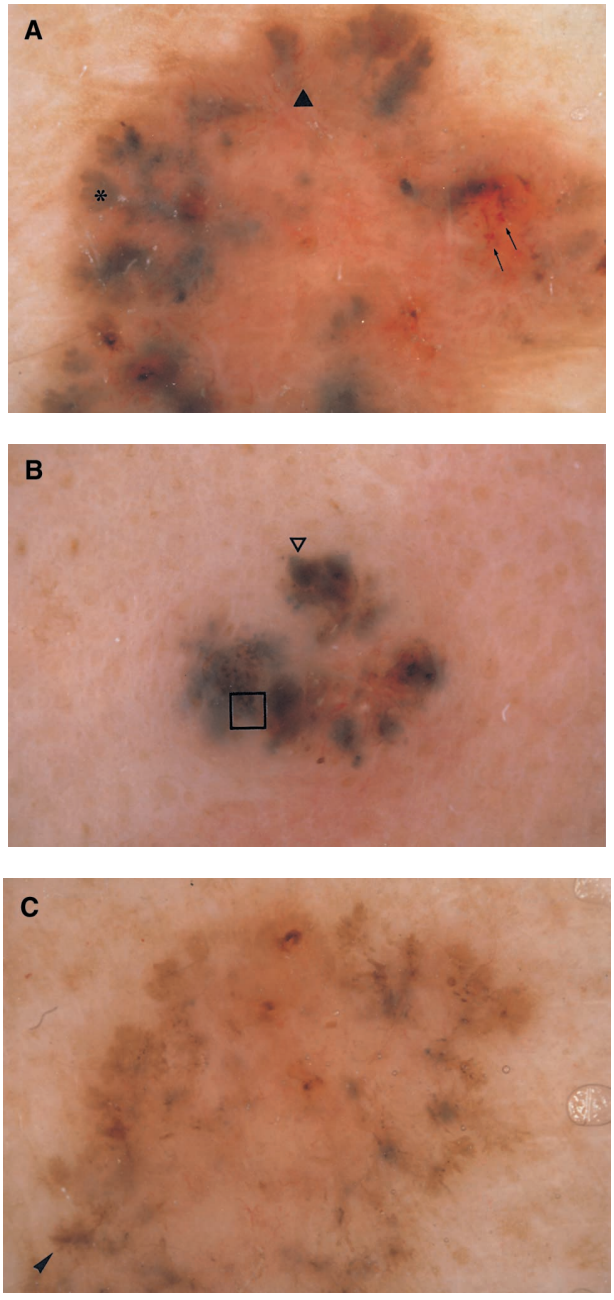

Figure 1. Positive dermoscopic features of pigmented basal cell carcinoma: A) ulceration (↑), arborizing telangiectasia (▲), and leaflike areas (*); B) multiple blue-gray globules (□), and large blue-gray ovoid nests (▽); C) spoke wheel area (►).

Table 2. Agreement Among All Observers and Pairwise Interobserver Agreement on Each Dermoscopic Criterion for Diagnosis of Pigmented BCC

	Agreement among observers A, B, C, D, and E										
		Pairwise comparisons (Cohen's kappa statistic)									
Dermoscopic criterion	*Global agreement*	*A vs. B*	*A vs. C*	*A vs. D*	*A vs. E*	*B vs. C*	*B vs. D*	*B vs. E*	*C vs. D*	*C vs. E*	*D vs. E*
Pigment network	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spoke wheel areas	0.85	0.543	0.162	0.373	0.373	0.344	0.650	0.300	0.472	0.208	0.481
Arborizing telangiectasia	0.72	0.762	0.831	0.842	0.699	0.683	0.695	0.560	0.842	0.699	0.640
Ulceration	0.49	0.681	0.569	0.546	0.741	0.476	0.415	0.598	0.744	0.517	0.645
Multiple blue-gray globules	0.41	0.537	0.415	0.466	0.560	0.417	0.499	0.330	0.490	0.251	0.330
Large blue-gray ovoid nests	0.28	0.379	0.263	0.340	0.447	0.344	0.410	0.240	0.402	0.159	0.240
Leaflike areas	0.26	0.078	0.699	0.346	0.221	0.110	0.470	0.106	0.296	0.144	0.178

Cohen's kappa statistic: $k \geq 0.40$ = good agreement.
Observers A, B, and D, highly experienced; observer C, moderately experienced; observer E, minimally experienced.

server agreement, we found complete concordance only for pigment network, and good concordance for ulceration and arborizing vessels for all observers (Table 2).

Discussion

In the present study we determined global and pairwise agreement of five dermatologists on the dermoscopic criteria proposed by Menzies et al.[9] for diagnosis of pigmented BCCs in order to test the reproducibility of each criterion. Regardless of their degree of experience, all observers could recognize the absence of a pigment network and the presence of at least one positive feature (ulceration, large blue-gray ovoid nests, multiple blue-gray globules, leaflike areas, spoke wheel areas, arborizing telangiectasia). As expected, there was full agreement among the five observers on the criterion of pigment network ($k = 1$). Presence of a pigment network is the most relevant diagnostic parameter of melanocytic skin lesions, and pigment network should not be identified in BCCs. The observers agreed on the criterion of spoke wheel areas ($k = 0.85$), which were rarely detected, suggesting that the presence of spoke wheel areas represents a unique and well-defined dermoscopic parameter.

The very good global concordance among observers concerning ulceration ($k = 0.72$) and the good agreement on arborizing telangiectasia ($k = 0.49$) may result from the specific morphology of both criteria. Multiple blue-gray globules showed a good overall concordance ($k = 0.41$). Lack of very good agreement on this criterion might be related to the absence of a clear-cut definition of the size of globules, dots, and ovoid nests, leading to a subjective interpretation of these criteria. No agreement was achieved for leaflike areas ($k = 0.26$) and large blue-gray ovoid nests ($k = 0.28$), indicating a lack of consensus for the definitions of these parameters. Indeed, leaflike areas might be misinterpreted as ovoid nests or localized pigmentation, and large blue-gray ovoid nests might be confused with globules or leaflike areas.

In conclusion, our results confirm the reproducibility of the method proposed by Menzies et al.[9] for dermoscopic diagnosis of pigmented BCC and show that ulceration, spoke wheel areas, and arborizing telangiectasia represent the most robust positive parameters.

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