SHORT COMMUNICATION

Dermoscopic Structures Predictive of Response to Photodynamic Therapy in Basal Cell Carcinoma

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The most common type of non-melanoma skin cancer is basal cell carcinoma (BCC), with incidence rates in Europe and the USA increasing from 519 to 1,019 (between 1998–2010) and from 606 to 1,488 (between 1986–2006) (1). Rates are predicted to continue to increase until at least 2040, owing to an aging population with historical exposure to ultraviolet (UV) light (2).

Photodynamic therapy (PDT) is recommended for treatment of primary superficial and thin low-risk nodular BCC. PDT is considered most appropriate for nodular lesions where surgical excision is contraindicated or in cases in which patients, based on past treatment history, comorbidities, and/or cosmetic considerations, are willing to accept a higher risk of recurrence (3).

However, dermatologists are often faced with doubts as to the effectiveness of PDT in a given BCC, and whether a lesion has been completely eradicated by the end of the treatment or whether residual disease persists. Dermoscopy, a non-invasive diagnostic technique, can aid the selection of patients who can benefit most from PDT, and can be used during follow-up to detect recurrences.

Clinical, histological, and immunohistochemical biomarkers that help predict the response of BCC to PDT have been described to date. However, only one study has evaluated the use of dermoscopy to assess patients' response to non-ablative therapies for the treatment of superficial BCC (4). The aim of the current study was to identify dermoscopic signs of BCC (superficial and nodular) predictive of the response to PDT.

MATERIALS AND METHODS

A prospective study of patients with biopsy-diagnosed BCC treated with photodynamic therapy–methyl aminolevulinate (PDT-MAL) at Miguel Servet University Hospital in Zaragoza, Spain, between 2019 and 2021 was performed.

After tumour curettage patients were treated with 16% MAL. After 3 h of light-impenetrable occlusion the area was illuminated with a red-light-emitting diode device, diode device Aktilite CL128 (Galderma Nordic AB, Uppsala, Sweden) with a fluence of 37 J cm^2 (8 min of ilumination at 10 cm of distance), repeating the session after 1 week. Clinicians were blinded to clinical status in order to avoid classification bias, and dermoscopic evaluations were always performed by the same clinician taking dermoscopic photographs. The presence of dermoscopic signs associated

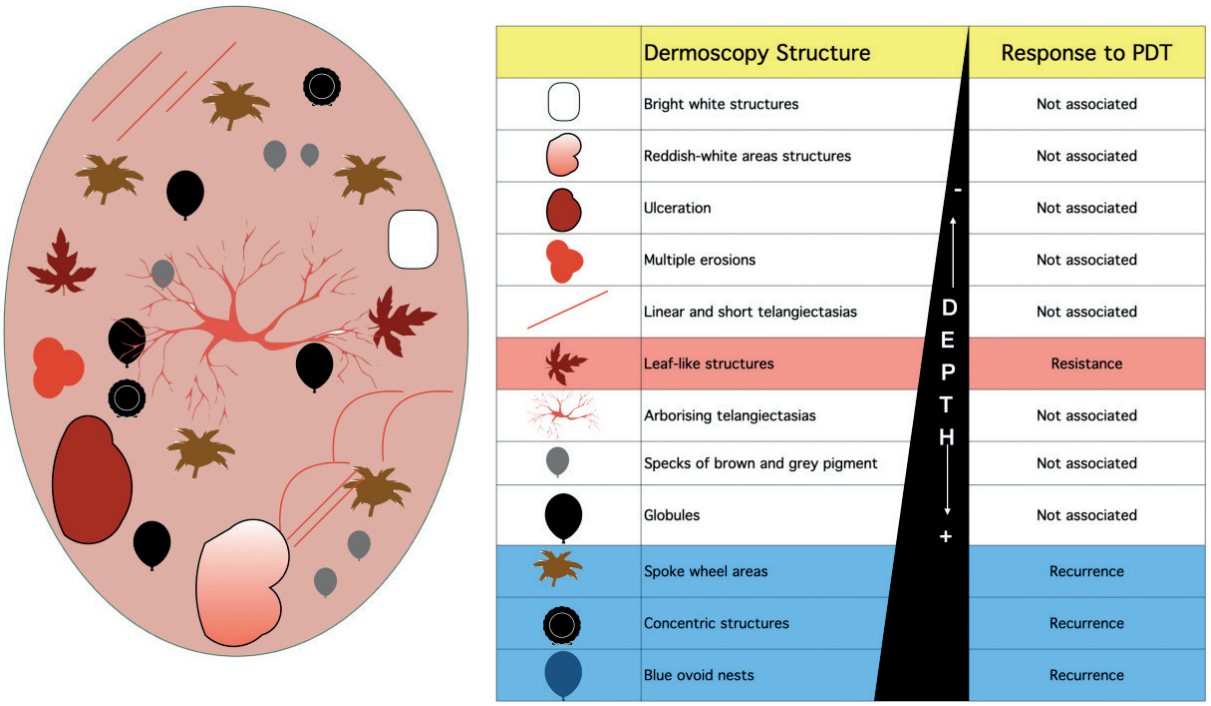

Fig. 1. Dermoscopic structures associated with basal cell carcinoma (BCC) and the response to photodynamic therapy (PDT).

with BCC (blue ovoid nests, globules, specks of brown and grey pigment, leaf-like structures, spoke wheel areas, concentric structures, arborizing telangiectasias, linear and short telangiectasias, multiple erosions, ulceration, reddish-white areas, and bright white structures) (5) was recorded in each case, as well as the response to PDT, evaluated by clinical and dermoscopic signs, performing a biopsy in doubtful cases, with a minimum follow-up period of 9 months. Non-responders were treated with surgery.

RESULTS

A total of 29 patients with a histological diagnosis of BCC (10 nodular and 19 superficial) were included in the study. The only dermoscopic pattern that was significantly associated with lack of response to PDT and/or recurrence, regardless of histological type, was the presence of spoke wheel areas ($p=0.043$). Values approaching significance were obtained for other signs related to the presence of pigment, such as leaf-like structures, and concentric structures ($p=0.063$ in both cases). Blue globules, spoke wheel areas, and concentric structures were significantly associated with recurrence ($p=0.022$, $p=0.000$, and $p=0.004$, respectively). No such associations were observed for the remaining variables studied (**Fig. 1** and **Table I**).

Table I. Statistical analysis of dermoscopic basal cell carcinoma (BCC) patterns associated with response/recurrence with photodynamic therapy (PDT)

	Response	No response	*p*-value	No recurrence	Recurrence	*p*-value
Ovoid nests						
Yes	3	3	0.369	6	0	0.271
No	16	7		19	4	
Blue globules						
Yes	4	4	0.278	5	3	**0.022**
No	15	6		20	1	
Dots						
Yes	7	4	0.868	9	2	0.592
No	12	6		16	2	
Leaf-like structures						
Yes	2	4	0.063	5	1	0.819
No	17	6		20	3	
Spoke wheel areas						
Yes	0	2	**0.043**	0	2	**0.000**
No	19	8		25	2	
Concentric structures						
Yes	2	4	0.063	3	3	**0.004**
No	17	6		22	1	
Arborizing telangiectasias						
Yes	8	4	0.913	11	1	0.474
No	11	6		14	3	
Linear and short telangiectasias						
Yes	10	4	0.518	12	2	0.941
No	9	6		13	2	
Multiple erosions						
Yes	7	5	0.494	11	1	0.474
No	12	5		14	3	
Ulceration						
Yes	2	1	0.965	2	1	0.300
No	17	9		23	3	
Reddish-white areas						
Yes	9	3	0.367	12	0	0.070
No	10	7		13	4	
Bright white structures						
Yes	5	3	0.701	7	1	0.864
No	14	6		17	3	

All patients have been followed at least 9 months. All non-responders/recurrence BCC were treated by surgical excision. Statistically significant ($p<0.05$) *p*-values are in bold.

DISCUSSION

In their study, Apalla et al. (4) highlighted the utility of dermoscopy as an adjuvant tool for naked-eye clinical examination to evaluate treatment outcome and monitoring of superficial BCCs after non-ablative therapy. The authors assessed residual disease-associated dermoscopic criteria proposed to predict the presence of residual/recurrent disease in all cases studied, and found that 21% of the lesions studied had been clinically miscategorised as achieving a complete response. In addition to these dermoscopic criteria, the current study describes new prognostic patterns, which should be evaluated before opting for non-ablative therapies, such as PDT.

This study found that superficial pigmented structures in BCCs located at the dermal-epidermal junction and superficial papillary dermis, such as spoke wheels, concentric structures, and leaf-like structures, were associated with a lack of response to PDT. This may be explained by the limited passage of light through these structures. Deeper pigment structures, such as globules, which are more characteristic of nodular BCCs, have been associated with greater recurrence.

Dermoscopy could help identify structures typical of pigmented BCCs and improve the response to PDT of BCCs with pigmented structures prior to curettage or debulking (6), thus achieving greater efficacy.

Certain dermoscopic features of BCCs may be predictive of the response to PDT, thereby enabling optimal selection of clinical treatment and aiding follow-up.

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