Standardization of dermoscopic terminology and basic dermoscopic parameters to evaluate in general dermatology (non-neoplastic dermatoses): an expert consensus on behalf of the International Dermoscopy Society*

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Summary

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Background Over the last few years, several articles on dermoscopy of non-neoplastic dermatoses have been published, yet there is poor consistency in the terminology among different studies.
Objectives We aimed to standardize the dermoscopic terminology and identify basic parameters to evaluate in non-neoplastic dermatoses through an expert consensus.
Methods The modified Delphi method was followed, with two phases: (i) identification of a list of possible items based on a systematic literature review and (ii) selection of parameters by a panel of experts through a three-step iterative

Conflicts of interest

None to declare.

*Plain language summary available online

procedure (blinded e-mail interaction in rounds 1 and 3 and a face-to-face meeting in round 2). Initial panellists were recruited via e-mail from all over the world based on their expertise on dermoscopy of non-neoplastic dermatoses.

Results Twenty-four international experts took part in all rounds of the consensus and 13 further international participants were also involved in round 2. Five standardized basic parameters were identified: (i) vessels (including morphology and distribution); (ii) scales (including colour and distribution); (iii) follicular findings; (iv) 'other structures' (including colour and morphology); and (v) 'specific clues'. For each of them, possible variables were selected, with a total of 31 different subitems reaching agreement at the end of the consensus (all of the 29 proposed initially plus two more added in the course of the consensus procedure).

Conclusions This expert consensus provides a set of standardized basic dermoscopic parameters to follow when evaluating inflammatory, infiltrative and infectious dermatoses. This tool, if adopted by clinicians and researchers in this field, is likely to enhance the reproducibility and comparability of existing and future research findings and uniformly expand the universal knowledge on dermoscopy in general dermatology.

What's already known about this topic?

- Over the last few years, several papers have been published attempting to describe the dermoscopic features of non-neoplastic dermatoses, yet there is poor consistency in the terminology among different studies.

What does this study add?

- The present expert consensus provides a set of standardized basic dermoscopic parameters to follow when evaluating inflammatory, infiltrative and infectious dermatoses.
- This consensus should enhance the reproducibility and comparability of existing and future research findings and uniformly expand the universal knowledge on dermoscopy in general dermatology.

Besides its well-established use in the assessment of skin neoplasms,[1] dermoscopy is increasingly gaining appreciation as a supportive tool in the diagnosis of various non-neoplastic dermatological diseases, including inflammatory, infiltrative and infectious dermatoses.[2–5] Over the last few years, several papers have been published attempting to describe the dermoscopic criteria seen in numerous dermatoses, but there is poor consistency in the terminology among different studies. The dermoscopic terms used are usually metaphorical and often poorly comprehensible.[2–5] The high variability in terminology is also explained by the lack of a widely accepted structured approach for the analysis of dermoscopic images of non-neoplastic dermatoses.[2–5] Indeed, most of the criteria described in the literature are based on authors' arbitrary descriptions.[2–5]

This heterogeneity poses significant limitations in evaluating the results of different studies comparatively, in designing new studies on the basis of pre-existing evidence and, overall, in expanding and spreading the existing knowledge in dermoscopy of dermatological diseases. Indeed, dermoscopy in general dermatology is still seen with reservation by some colleagues and has not yet acquired a standard role in the daily practice for applications other than skin neoplasms,[6] despite evidence suggesting that it improves diagnostic accuracy.[7]

In 2015, the International Dermoscopy Society published a consensus paper on standardization of dermoscopic terminology.[8] This consensus proposed a set of dermoscopic criteria that were assessed as highly recognizable and reproducible and were defined with both analytical (descriptive) and metaphorical terms. The consensus focused mainly on skin neoplasms and only a few criteria seen in inflammatory diseases were included. Therefore, the 2015 consensus is considered inadequate for applying dermoscopy in diseases other than skin neoplasms.

Based on the design and methods used in the 2015 consensus, we aimed to standardize the dermoscopic terminology and identify basic parameters to be evaluated in non-

neoplastic dermatoses through a consensus among international experts.

Materials and methods

The study was performed on behalf of the International Dermoscopy Society. The consensus was performed according to the modified Delphi method[9,10] and consisted of two phases: (i) identification of a list of possible basic dermoscopic parameters based on a systematic literature review and (ii) selection of parameters by a panel of experts through a three-step iterative procedure designed as two rounds of e-mail questionnaires with an intermediate face-to-face meeting. The Delphi method is an iterative process aiming to gain expert consensus on variable issues lacking adequate evidence, by using at least two rounds of questionnaires and involving at least five to 10 participants.[11,12] The modified Delphi method additionally allows interaction among experts, offering the opportunity to present arguments and justify or modify viewpoints, and is generally considered superior to the classic procedure.[9,10]

Identification of possible basic dermoscopic parameters

Firstly, one of the authors (E.E.) searched the PubMed database to identify articles written in English that were published up to 31 December 2016, using the keywords 'dermoscopy' or 'dermatoscopy'; the search displayed 3943 publications. Abstracts and titles were screened independently by the two coordinators of the consensus (E.E. and A.L.) to identify articles reporting dermoscopic features of at least one inflammatory, infiltrative or infectious dermatosis. The final selection was performed in consensus among the two authors above and a third author (I.Z.). In total, 363 articles were selected for full-text review. Reviews, articles on neoplastic lesions, and articles on hair, nail and mucous membrane diseases were excluded.

All of the retrieved studies were classified according to standard definitions for diagnostic accuracy studies[13–15] and their level of evidence was assigned based on The Oxford 2011 Levels of Evidence.[16] The full-text review included 208 single case reports, 139 case series, 11 case–control studies and five cross-sectional studies. More than 95% of the studies had a level of evidence of V, while in 16 studies the level of evidence ranged from II to IV. In total, 195 different dermatoses and 902 dermoscopic findings were analysed.

The two coordinators of the consensus (E.E. and A.L.) identified five main morphological parameters that need to be evaluated, and proposed all of the possible values that each variable might take. The selection of the basic parameters followed a previously proposed classification,[2–5] which was slightly modified, and was based on the frequency of described features in the literature, on the histopathological correspondence of each feature and on experts' personal opinions. In detail, the previous classification included the following basic parameters: vessel morphology and distribution, scale distribution, background colours, follicular abnormalities and specific clues.[2–5] In the present consensus, we also considered scale colour and replaced the parameter 'background colour' with 'other structures' (i.e. nonscaling, nonvascular and nonfollicular findings), with evaluation of their colour and morphology. For each parameter, several possible subitems were identified and proposed, for a total of 29. In line with the 2015 consensus on terminology, metaphorical terms were avoided as much as possible.

Panel selection

The panel of experts was selected via e-mail from all over the world based on expertise in the field of dermoscopy in general dermatology and dermoscopy in general, as justified by published studies, books and active roles in scientific societies and congresses. Specifically, all of the members of the executive board of the International Dermoscopy Society were invited to join the panel, as well as researchers who had published at least five peer-reviewed articles on such a topic as either the first or last author. Overall, 38 international experts were invited as panel members. Panellists' assessments remained anonymous during the whole consensus process, with the exception of the face-to-face meeting.

Round 1

The list of proposed items was circulated via e-mail to all recruited panellists, along with a detailed description of the aims and instructions of the consensus process. Participants were asked to judge on a 5-point scale the relevance of each variable and its possible values and their level of agreement on the term used. The relevance scale included 0, don't know; 1, not at all relevant; 2, slightly relevant; 3, moderately relevant; 4, relevant; and 5, very relevant. The scale used to rate the terminology was as follows: 1, no agreement; 2, low agreement; 3, moderate agreement; 4, agreement; 5, strong agreement. Experts were also given the opportunity to provide comments and suggest additional variables and values that might not have been included in the proposed list. Each parameter and subitem was admitted to the second round of the consensus procedure if more than 80% of the experts rated it 4 or 5 out of 5 in both relevance and terminology. Of note, the agreement threshold of 80% was chosen according to the literature recommendation on Delphi consensus.[12]

Round 2

Parameters that received consensus during round 1 were shown to the attendees of the International Dermoscopy Society consensus meeting during the 76th American Academy of Dermatology annual meeting in San Diego, U.S.A. All of the attendees were asked to evaluate the selected parameters and subitems in terms of their relevance and terminology

(separately) through a show of hands to express agreement (corresponding to a score of 4 or 5) or disagreement (corresponding to a score of 3 or less). Participants could also provide comments and suggest additional parameters and subitems other than those selected from round 1. According to literature data,[12] 80% agreement was chosen as an appropriate cut-off to include each parameter or subitem in the final document. Possible parameters and subitems not reaching 80% agreement in their relevance and/or terminology would be modified according to feedback provided during the face-to-face meeting and redistributed, along with new proposed parameters and subitems, to the panel of experts for round 3.

Round 3

In the final round, the panel of experts had to assess new parameters and subitems proposed during round 2 and revise parameters and subitems that did not reach 80% agreement in the second round, following the same methods as the first round. Parameters and subitems for which more than 80% of the experts gave a score of 4 or 5 in both relevance and terminology would be included in the final document.

Results

Twenty-four panellists took part in all the rounds of the consensus, and 13 further participants were involved in round 2 (face-to-face meeting), for a total of 37 participants. All of the five originally proposed parameters, including 29 subitems (Table 1), reached agreement in both relevance and terminology during the first round of the consensus procedure and were therefore admitted to evaluation in the second round. In this step, all of the selected parameters and subitems reached full approval from the participants (100% agreement), thereby being considered suitable for inclusion in the final document without going through the third round of evaluation. Agreement rates and mean scores for rounds 1 and 2 are shown in Table 1.

Of note, the addition of three further subitems – brown colour for parameter 2 ('scales') and purple and rainbow-like colour for parameter 4 ('other structures') – was proposed during round 2. Therefore, all of these subitems went through round 3 of the consensus process, but only brown scales and purple colour achieved agreement in both relevance and used terminology (Table 1). In contrast, rainbow-like colour did not reach the agreement threshold in relevance and terminology and was therefore excluded. Consequently, at the end of the consensus, in total five parameters and 31 subitems (all of the 29 proposed initially plus two added in the course of the consensus procedure) were identified.

Table S1 (see Supporting Information) summarizes all of the parameters and subitems selected in the present consensus, with their previous nomenclature (if any), histological background and main dermatoses characterized by each subitem.

Vessels

Vessel morphology

Four vessel morphologies were included in the consensus, namely dotted, linear (without bends and/or branches), linear with branches and linear curved (Fig. 1).

Dotted vessels include roundish vessels of any size, without differentiating dotted from pinpoint, globular or glomerular vessels. This is because it has been suggested that most of the inflammatory diseases may display dotted vessels of variable diameter and there is no indication that categorization by diameter could have any diagnostic significance when using low-magnification (handheld) dermoscopes.[2–5] Dotted vessels histologically correspond to the tips of vertically arranged, dilated vessels in dermal papillae[17,18] and were initially described as a typical finding of psoriasis (Fig. 2a), but subsequent studies have shown that they can be found in many other inflammatory dermatoses (e.g. dermatitis, lichen planus, pityriasis rosea and porokeratosis).[2–5] Dotted vessels represent the most frequently seen morphological type of vessels in non-neoplastic entities.

Linear vessels are dermoscopically visible in several dermatoses and correspond to dilated dermal vessels that are located parallel to the skin surface. Linear vessels can be seen in dermatoses such as mycosis fungoides (Fig. 2b), rosacea, lichen planus and discoid lupus erythematosus.[2–5] Linear vessels are also seen in epidermal atrophy of any cause (e.g. induced by chronic sun exposure or steroids).[2–5]

Linear vessels with branches are quite common in neoplasms and represent the dermoscopic hallmark of basal cell carcinoma.[17,18] In the field of general dermatology, linear vessels with branches can be found mainly in granulomatous diseases (Fig. 2c) and discoid lupus erythematosus.[2–5]

Finally, linear curved vessels include comma-shaped, chalice-shaped, hairpin-like and linear-helical vessels (displaying more than one curve around a central axis). Grouping together these vascular morphological types was based on the obvious overlap among them and on the lack of any evidence suggesting or even indicating a diagnostic benefit when discriminating among them.[2–5] Histologically, linear curved vessels usually correspond to the convoluted dermal vessels that may be found in several inflammatory dermatoses, such as plasma cell balanitis (Fig. 2d), granulomatous disorders and mycosis fungoides.[2–5]

Vessel distribution

The distribution pattern of the vascular structures on the lesion's surface is of equal importance to their morphological type. The vessels can be distributed in five main patterns: uniform, clustered, peripheral, reticular and unspecific (Fig. 3).

Uniform indicates vascular structures that are equally and homogeneously arranged all over the surface of the lesion. It typifies psoriasis but can also be seen in case of lichenification (Fig. 4a).[2–5]

Table 1 Proposed basic dermoscopic parameters and subitems with corresponding agreement rates (percentage of experts giving a score of 4 or 5) and mean scores for each round

	Round 1		Round 2		Round 3	
Parameter	Terminology[a]	Relevance[a]	Terminology[b]	Relevance[b]	Terminology[a]	Relevance[a]
1 Vessels	100 (5·00)	100 (4·82)	100	100	NP	NP
1·1 Vessel morphology	100 (5·00)	100 (4·76)	100	100	NP	NP
Dotted	100 (5·00)	100 (4·65)	100	100	NP	NP
Linear (without bends or branches)	100 (4·83)	92 (4·32)	100	100	NP	NP
Linear with branches	100 (4·89)	92 (4·25)	100	100	NP	NP
Linear curved	83 (4·73)	83 (4·13)	100	100	NP	NP
1·2 Vessel distribution	100 (5·00)	100 (4·79)	100	100	NP	NP
Uniform	100 (4·57)	100 (4·73)	100	100	NP	NP
Clustered	92 (4·68)	83 (4·31)	100	100	NP	NP
Peripheral	100 (4·88)	83 (4·11)	100	100	NP	NP
Reticular	83 (4·21)	83 (4·08)	100	100	NP	NP
Unspecific	83 (4·13)	83 (4·43)	100	100	NP	NP
2 Scales	100 (5·00)	92 (4·68)	100	100	NP	NP
2·1 Scale colour	100 (5·00)	100 (4·83)	100	100	NP	NP
White	100 (5·00)	100 (4·74)	100	100	NP	NP
Yellow (scales and crusts)	100 (5·00)	100 (4·79)	100	100	NP	NP
Brown	–	–	–	–	100 (5·00)	83 (4·32)
2·2 Scale distribution	100 (5·00)	83 (4·22)	100	100	NP	NP
Diffuse	100 (4·82)	83 (4·31)	100	100	NP	NP
Central	100 (4·77)	83 (4·18)	100	100	NP	NP
Peripheral	100 (5·00)	92 (4·42)	100	100	NP	NP
Patchy	83 (4·23)	83 (4·11)	100	100	NP	NP
3 Follicular findings	92 (4·42)	83 (4·31)	100	100	NP	NP
Follicular plugs	92 (4·78)	92 (4·57)	100	100	NP	NP
Follicular red dots	83 (4·23)	83 (4·12)	100	100	NP	NP
Perifollicular white colour	92 (4·89)	83 (4·18)	100	100	NP	NP
Perifollicular pigmentation	100 (4·91)	83 (4·09)	100	100	NP	NP
4 Other structures[c]	83 (4·25)	92 (4·71)	100	100	NP	NP
4·1 Colour	100 (5·00)	100 (4·77)	100	100	NP	NP
White	100 (5·00)	100 (4·83)	100	100	NP	NP
Brown	100 (5·00)	83 (4·23)	100	100	NP	NP
Grey	100 (5·00)	83 (4·18)	100	100	NP	NP
Blue	100 (5·00)	83 (4·24)	100	100	NP	NP
Orange	100 (5·00)	100 (4·72)	100	100	NP	NP
Yellow	100 (5·00)	83 (4·21)	100	100	NP	NP
Purple	–	–	–	–	100 (5·00)	100 (4·68)
Rainbow-like	–	–	–	–	63 (3·17)	58 (2·11)
4·2 Morphology	100 (5·00)	100 (4·81)	100	100	NP	NP
Structureless[d]	100 (4·21)	100 (4·75)	100	100	NP	NP
Dots or globules	100 (4·86)	92 (4·61)	100	100	NP	NP
Lines[e]	100 (4·74)	92 (4·21)	100	100	NP	NP
Circles	92 (4·43)	83 (4·13)	100	100	NP	NP
5 Specific clues[f]	92 (4·28)	100 (4·76)	100	100	NP	NP

NP, not performed. [a]Agreement rate (mean score). [b]Agreement rate. Agreement rate is measured from 0% to 100%, mean score is measured from 0 to 5. [c]Structures other than vessels, scales and follicular findings. [d]Diffuse (as a background) or focal. [e]Parallel, reticular, perpendicular, angulated or unspecifically arranged. [f]Features that, when present, are strongly suggestive of only one diagnosis (in general or among a limited number of differential diagnoses) as they are related to highly specific or sensitive histological findings.

Clustered represents vessels aggregated in small groups. This pattern may be seen in dermatitis (Fig. 4b), and results from vessel dilation in focally elongated dermal papillae (focal papillomatosis).[2–5]

Peripheral vessels are mainly arranged at the periphery of the lesion. This distribution pattern is classically seen in dermatoses typified by significant epidermal changes in the central part of the lesions, for example discoid lupus erythematosus (Fig. 4c) and lichen planus.[2–5]

Reticular indicates vascular structures in a network-like arrangement. This may be seen in psoriasis (dotted vessels), also known as 'red globular rings' or 'string of pearls', and

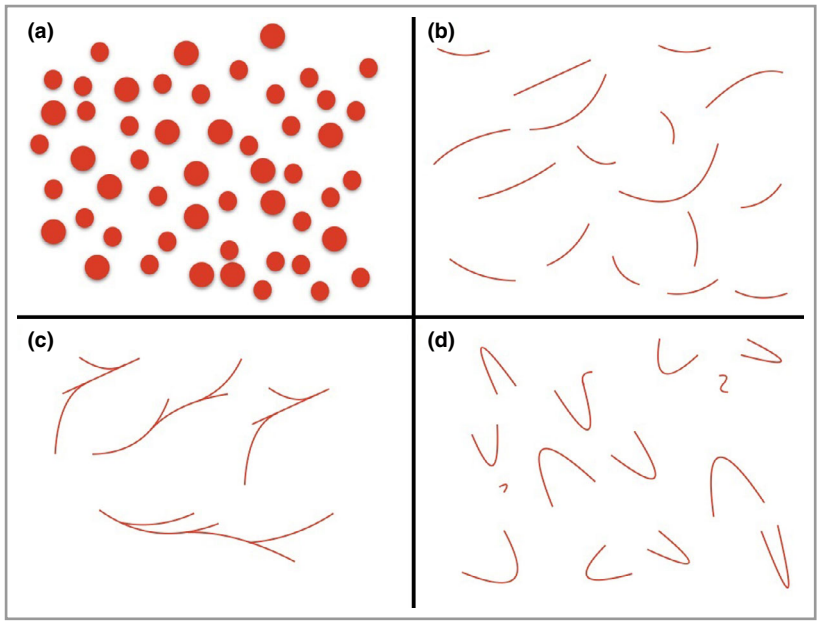

Fig 1. Morphological types of vessels: (a) dotted vessels of variable diameter; (b) linear vessels (not curved and without branches); (c) linear vessels with branches; and (d) linear curved vessels.

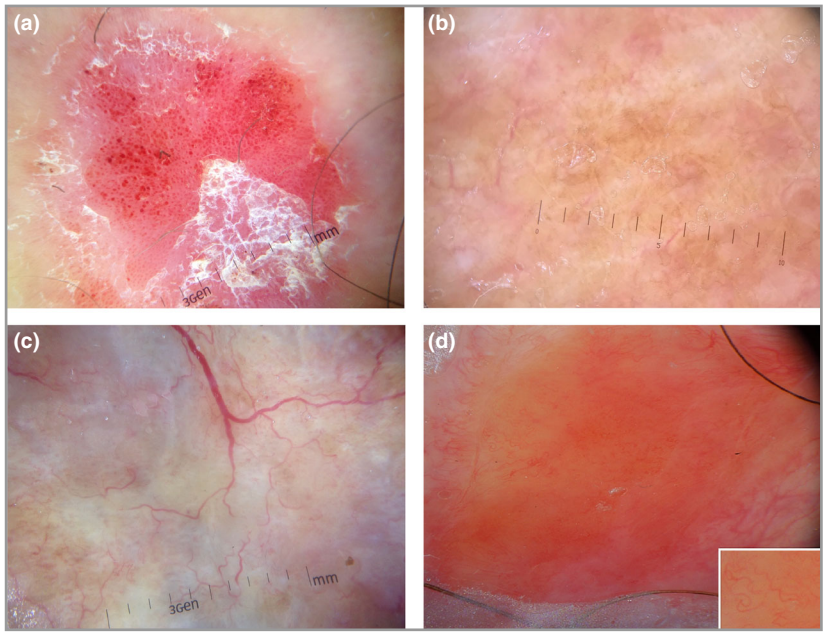

Fig 2. Examples of the four vessel morphologies (images taken from representative lesions or lesional areas). (a) Dotted vessels in psoriasis; (b) linear vessels (distributed in an unspecific pattern) in mycosis fungoides; (c) linear vessels with branches in necrobiosis lipoidica; and (d) linear curved vessels in plasma cell balanitis.

rosacea (linear vessels; Fig. 4d), also called 'polygonal' vascular pattern.[2–5]

Unspecific (also known as asymmetrical or patchy arrangement) vascular structures are arranged randomly without following any of the other patterns. They can be seen in many diseases, such as dermatitis, mycosis fungoides (Fig. 2b) and pityriasis rosea.[2–5]

Scales

Scale colour

Three possible scale colours have been identified, namely white, yellow and brown (Fig. 5). Each of these reflects a specific histological background.

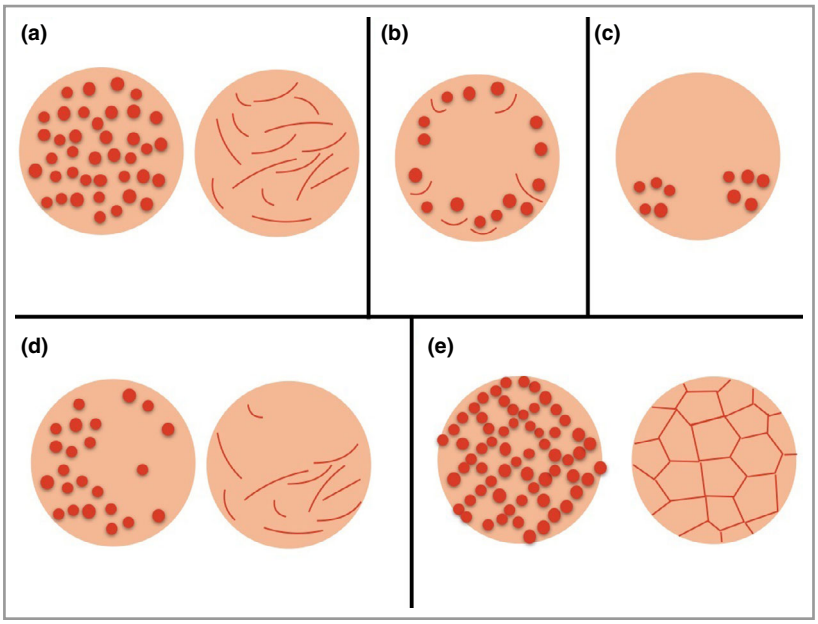

Fig 3. Possible distributions of vessels: (a) uniform; (b) peripheral; (c) clustered; (d) unspecific; and (e) reticular.

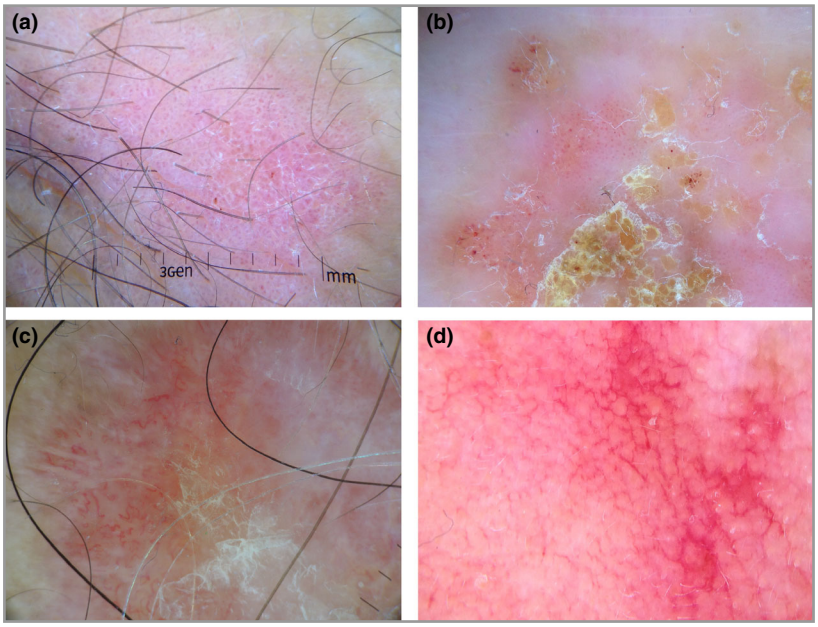

Fig 4. Examples of vessel distribution morphologies (images taken from representative lesions or lesional areas). (a) Uniform dotted vessels in lichen simplex chronicus; (b) clustered dotted vessels in dermatitis; (c) peripheral linear curved vessels in discoid lupus erythematosus; and (d) reticular linear vessels in rosacea.

White scales typify dermatoses characterized by hyperkeratosis (especially parakeratosis) without serum exudation, such as psoriasis, lichen planus, discoid lupus erythematosus, mycosis fungoides, pityriasis lichenoides chronica, pityriasis rubra pilaris (Fig. 6a) and many others.[2–5]

Yellow scales are often associated with yellow crusts. They represent the result of exudation or serum that might dry (crusts) or might be admixed with keratin (scales). Yellow scales or crusts are the dermoscopic hallmark of all types of dermatitis, histologically corresponding to the underlying spongiosis.[2–5] They are also visible in other conditions characterized by serum extravasation, including acantholytic dermatoses such as pemphigus vulgaris (Fig. 6b) and Darier disease.[2–5]

Brown scales result from a mixture of keratin and either exogenous or endogenous pigment, such as dirt or melanin.

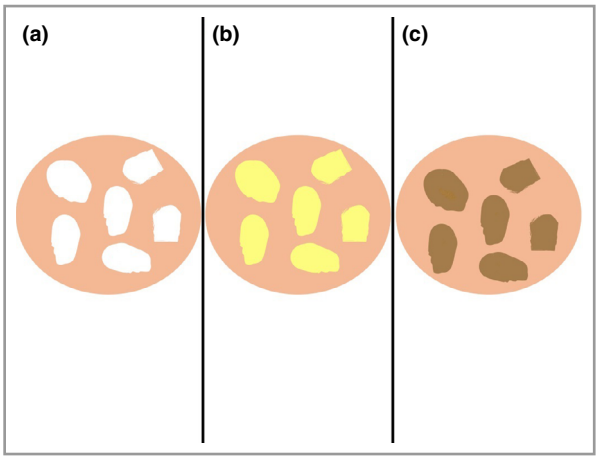

Fig 5. Colour of scales: (a) white scales; (b) yellow crusts and scales; and (c) brown scales.

Terra firma-forme dermatosis and dermatosis neglecta (Fig. 6c) represent two typical examples.[19]

Scale distribution

Four scale distribution patterns were selected in the consensus: diffuse, central, peripheral and patchy (Fig. 7).

Diffuse scale covers the whole surface of the lesion. It cannot be considered specific for any diagnosis, as diffuse scales can be seen in several hyperkeratotic dermatoses and are very commonly seen in psoriasis (Fig. 8a).[2–5]

Central scales are located predominantly in the centre of the lesion. Again, this pattern cannot be considered as specific because it is visible in many conditions, including hypertrophic lichen planus, pityriasis lichenoides chronica and discoid lupus erythematosus (Fig. 8b).[2–5]

Peripheral scales spare the centre and are distributed mainly at the periphery. They are a classic sign of pityriasis rosea (Fig. 8c) but can also be seen in tinea corporis, erythema annulare centrifugum, and other entities that have a centrifugal pattern of expansion.[2–5]

Patchy indicates random and asymmetrical distribution of scales. This arrangement is less specific as it may be seen in many diseases (e.g. dermatitis; Fig. 8d).

Follicular findings

The four proposed follicle-associated dermoscopic criteria include follicular plugs, follicular red dots, perifollicular white colour and perifollicular pigmentation (Fig. 9).

Follicular plugs represent the most frequent finding and correspond to follicular hyperkeratosis, which is a histological feature of several dermatoses, such as cutaneous leishmaniasis, discoid lupus erythematosus, hypertrophic lichen planus, lichen sclerosus (Fig. 10a), follicular mycosis fungoides and follicular mucinosis.[2–5] The colour of the plugs may be white (keratin alone), yellow (keratin plus serum) or, less commonly, brown (keratin plus melanin or exogenous pigment). Of note, more than one colour may be seen, alone or in combination.[2–5] Importantly, white keratotic plugs in inflammatory lesions may appear as four white points arranged as a four-leaf clover (the so-called 'rosettes') on polarized dermoscopy.[20]

Follicular red dots reflect the presence of perifollicular inflammation and may be found in common diseases, such as early stages of discoid lupus erythematosus, and less frequent dermatoses, including follicular mucinosis (Fig. 10b) or follicular mycosis fungoides.[2–5]

Perifollicular white colour may histologically correspond to perifollicular fibrosis (e.g. discoid lupus erythematosus; Fig. 10c), to epidermal hyperplasia (e.g. hypertrophic lichen planus) or to perifollicular depigmentation (e.g. vitiligo).[2–5]

Perifollicular pigmentation may be found in several pigmentary diseases, but its relevance is greater in vitiligo, where it represents the first sign of repigmentation (Fig. 10d).[2–5,21]

Other structures

This parameter includes structures other than vessels, scales and follicular findings. This is, by definition, a heterogeneous group of dermoscopic structures that might result from different histological alterations, such as epidermal changes, cellular infiltrations or deposits of melanin or other substances. According to the present consensus, the structures should be classified according to their colour and morphology.

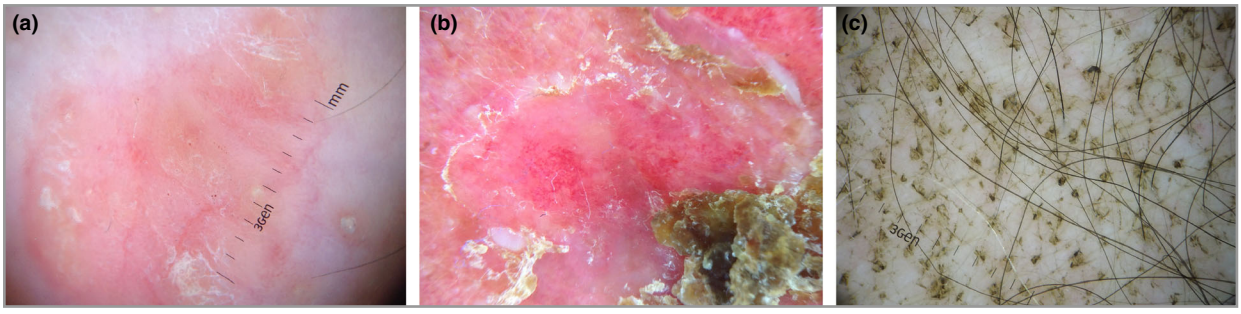

Fig 6. Examples of the three colours of scales (images taken from representative lesions or lesional areas). (a) White in pityriasis rubra pilaris; (b) yellow in pemphigus vulgaris; and (c) brown in dermatosis neglecta.

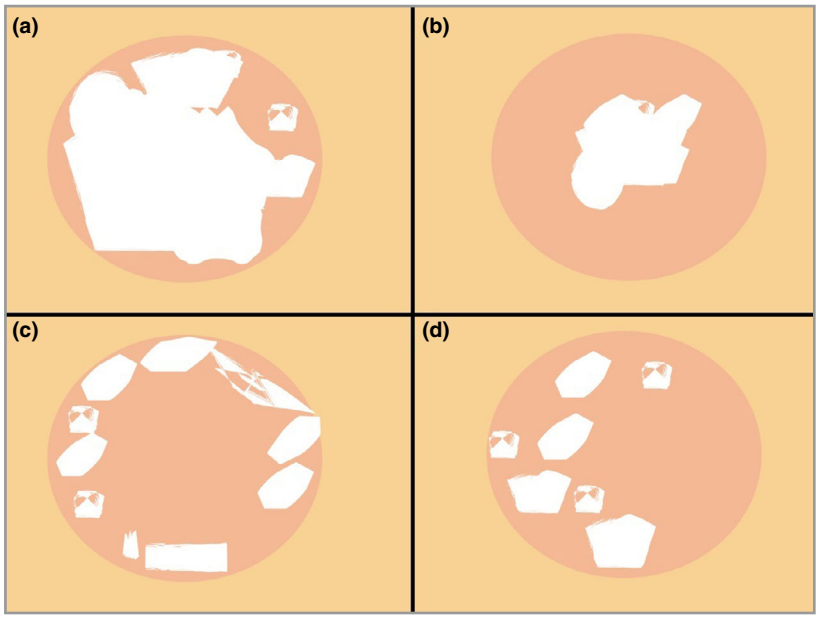

Fig 7. Possible distributions of scales: (a) diffuse; (b) central; (c) peripheral; and (d) patchy.

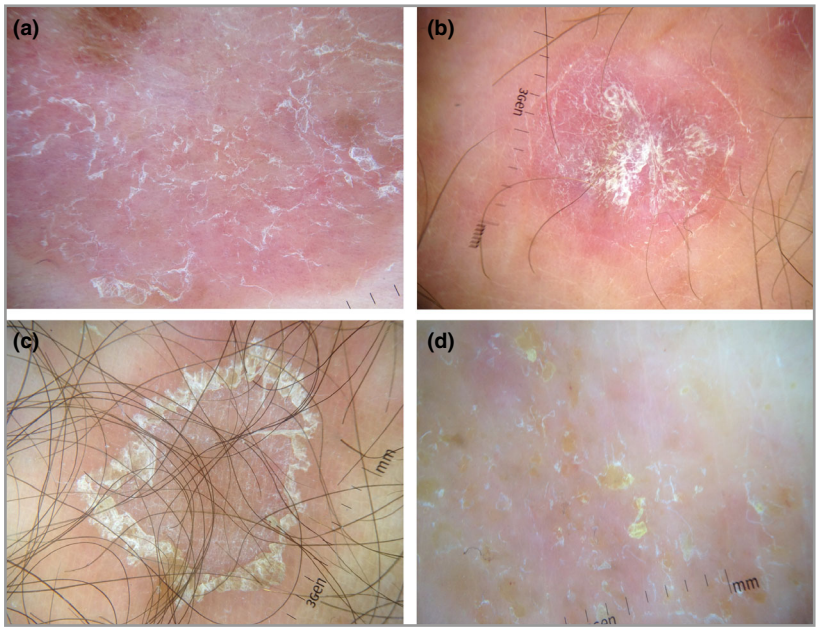

Fig 8. Examples of the four distributions of scales (images taken from representative lesions or lesional areas). (a) Diffuse in psoriasis; (b) central in discoid lupus erythematosus; (c) peripheral in pityriasis rosea; and (d) patchy in dermatitis.

Colour

Seven different colours were selected in the consensus, namely white, brown, grey, blue, orange, yellow and purple; each of them corresponds to specific histological findings (Table S1; see Supporting Information). The colour might be the main characterizing feature of a specific disease. For example, it is well known that granulomatous skin diseases are classically typified by orange colour, which reflects the presence of a compact cellular infiltrate in the dermis ('mass effect').[22,23]

Morphology

Four types of morphology may be identified, namely structureless areas, dots or globules, lines (which may be parallel, reticular, perpendicular, angulated or unspecifically arranged) and circles (Fig. 11). Of note, structureless areas may be diffuse (resulting in a relatively homogeneous background) or focal coloured zones of unspecific shape, without any recognizable structure. Figure 12 shows some examples featuring the four possible morphologies.

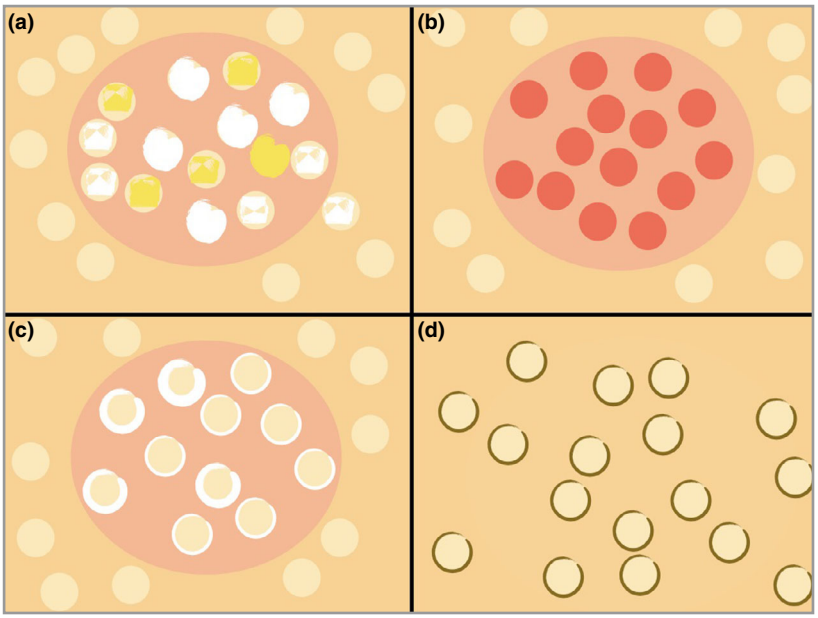

Fig 9. Follicular features: (a) follicular plugs; (b) follicular red dots; (c) perifollicular white colour; and (d) perifollicular pigmentation.

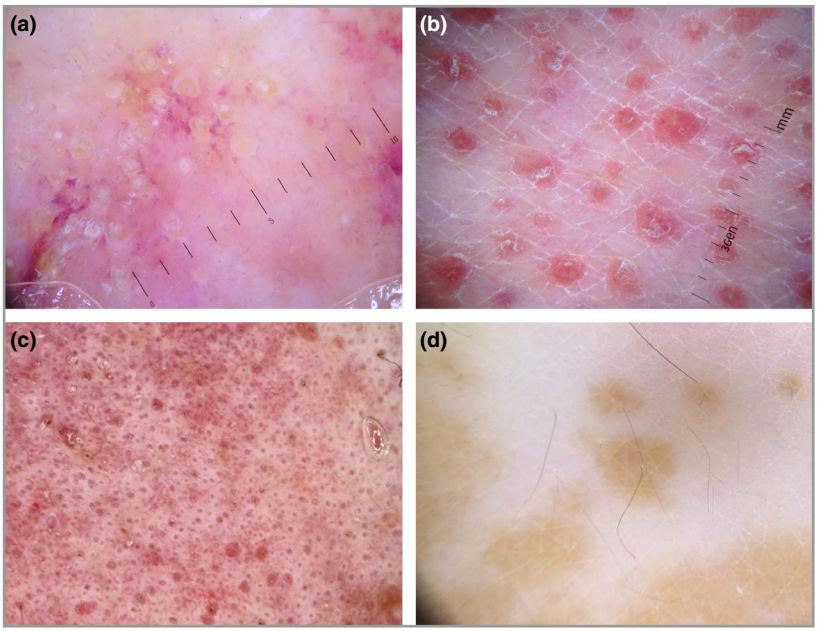

Fig 10. Examples of the four follicular findings (images taken from representative lesions or lesional areas). (a) Follicular plugs in lichen sclerosus; (b) follicular red dots in follicular mucinosis; (c) perifollicular white colour in discoid lupus erythematosus; and (d) perifollicular pigmentation in vitiligo.

Specific clues

Specific clues are considered features that, when present, are strongly suggestive of only one diagnosis (in general or among a limited number of differential diagnoses) as they are related to highly specific histological findings (Fig. 13).[17] Several specific clues have been reported in the literature so far, but probably many others are yet to be described. Some examples include Wickham striae in lichen planus (related to hypergranulosis; Fig. 14a), peripheral keratotic structure with two free edges in porokeratosis (related to cornoid lamella; Fig. 14b) and the 'jet with contrail' in scabies (corresponding to the anterior part of the mite with its burrow; Fig. 14c).[2–5] Table S1 (see Supporting Information) includes more examples.

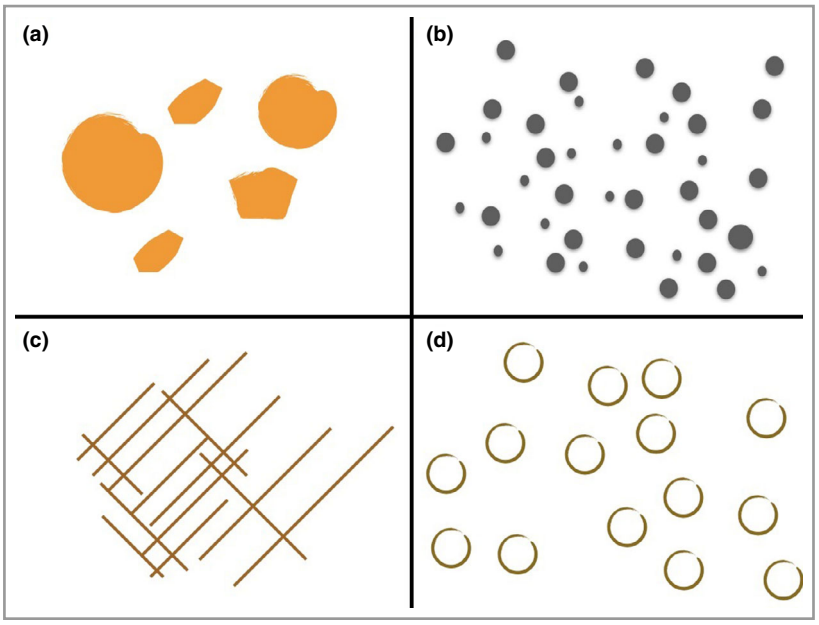

Fig 11. Other structures (shapes): (a) focal structureless areas; (b) dots; (c) lines; and (d) circles.

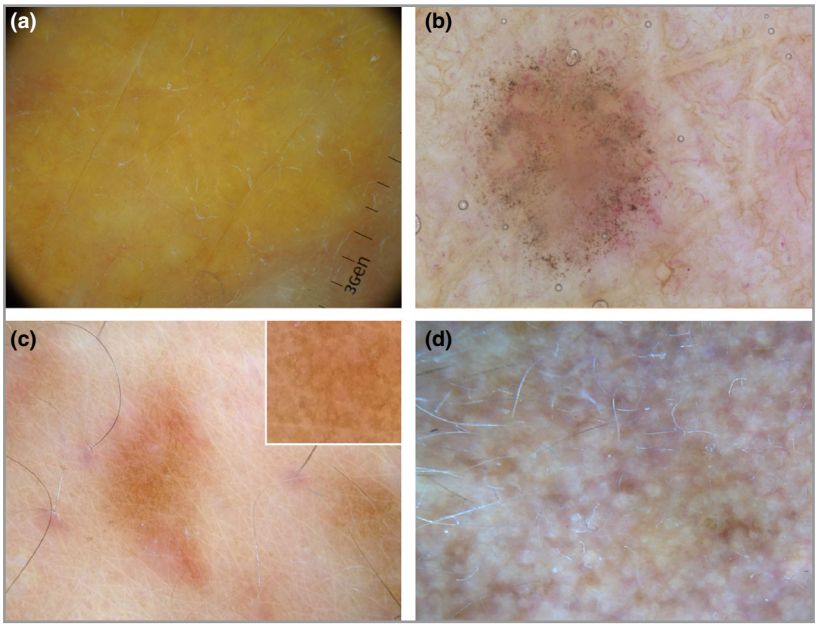

Fig 12. Examples of 'other structures' (images taken from representative lesions or lesional areas). (a) Diffuse structureless bright yellow area in plane xanthomatosis; (b) brown dots in lichen pigmentosus; (c) brown lines arranged in a network-like structure in urticaria pigmentosa; and (d) brown-grey and brown-blue circles in exogenous ochronosis.

Discussion

This Delphi study represents the first consensus on the classification and terminology of basic dermoscopic parameters to evaluate in inflammatory, infiltrative and infectious dermatoses. Indeed, so far, the description of dermoscopic features of several skin diseases has been arbitrary, variable and often confusing, based on authors' personal view. This expert consensus provides five standardized basic parameters, with a total of 31 subitems, that may be combined, like letters of the alphabet, to describe uniformly the dermoscopic pattern of non-neoplastic dermatoses (Table S1; see Supporting Information).[24–46] Notably, although dermoscopy usually reveals a homogeneous picture in the context of the same lesion, it has to be kept in mind that the dermoscopic findings of these conditions may vary according to the stage of development of

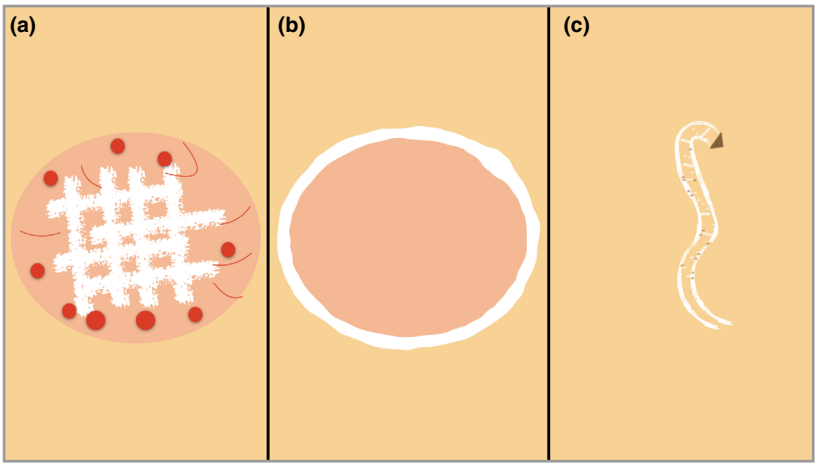

Fig 13. Examples of specific clues. (a) Wickham striae of lichen planus; (b) white keratotic rim with double free edge of porokeratosis; and (c) 'jet with contrail' in scabies.

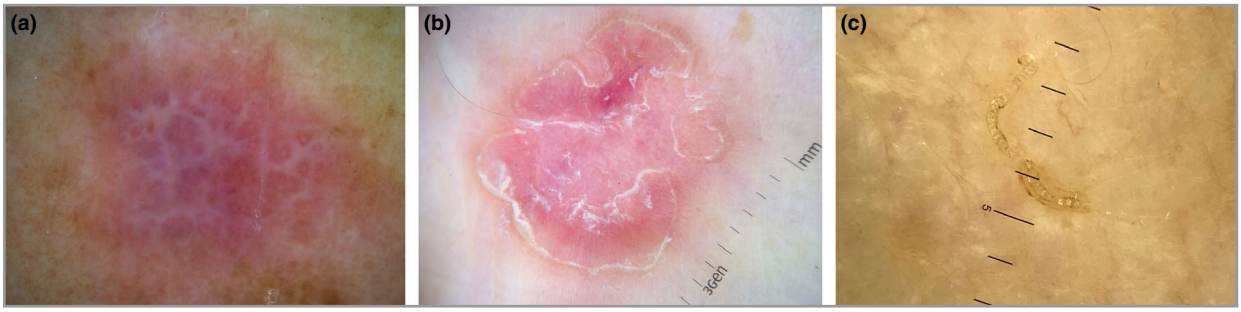

Fig 14. Three examples of specific dermoscopic clues (images taken from representative lesions or lesional areas). (a) Wickham striae in lichen planus; (b) white keratotic rim with double free edge in porokeratosis; and (c) 'jet with contrail' in scabies.

the lesions, and dermoscopic examination may provide more useful information if performed on active lesions.

It is important to underline that the specific relevance of each parameter should be determined on a case-by-case basis according to its distribution in the context of the lesion, with 'predominant' structures (i.e. those seen in the larger part of the lesion and prevailing over other coexisting features) being more relevant. Indeed, every non-neoplastic dermatosis is usually typified by one or two predominant criteria, whose diagnostic accuracy must obviously be validated by controlled studies.[23]

Importantly, all of the provided parameters and subitems should be viewed as a basic guide, and further details for each subitem may be specified if found to be relevant to characterize and differentiate one or more conditions due to strict correspondence with specific histological features. For example, both sarcoidosis and discoid lupus erythematosus may display linear vessels with branches, but, unlike the latter, in sarcoidosis the vessels are focused due to the presence of a dense cellular infiltrate that pushes the dermal vessels towards the skin surface, thus making them appear sharper.[2]

Despite the remarkable benefits of an expert consensus on a quite nebulous field like dermoscopy of non-neoplastic dermatoses, our work has several limitations that need to be addressed. Firstly, although the number of panellists in our study was higher than the minimum threshold suggested in the literature (i.e. 20 panellists),[47] nearly 40% (14 of 38) of the invited panel members did not take part in the study. Nevertheless, although reduced in size, the expert panel recruited for the consensus procedure had greater experience in dermoscopy of non-neoplastic dermatoses than the original potential panellists' composition. Indeed, 10 of the 14 dermatologists not included in the study were executive board members of the International Dermoscopy Society who refused the invitation because their research activity and clinical experience were focused mainly on neoplastic dermatoses. Notably, the remaining four potential panellists not participating in the consensus were researchers who had published at least five papers as either first or last author on dermoscopy of non-neoplastic dermatoses but did not respond at all to our invitation.

Importantly, even though the recommendations provided in this paper are based on literature data and a structured consensus among experts on the topic, they are influenced by personal opinions and the clinical experience of the panellists. Additionally, it is noteworthy to underline that the level of

evidence of the available literature on dermoscopy of non-neoplastic dermatoses was quite low, with more than 95% of the studies having a level of evidence of V.

Based on the Delphi consensus guidelines,[12,48,49] in the present study the agreement on each parameter and subitem was defined as a score of 4 or 5, while 80% was chosen as the agreement threshold among the panellists. Although such cut-off rates are methodologically considered as appropriate according to literature data, they cannot ensure an absolute agreement.[12,48,49] However, most of the parameters and subitems of this consensus reached an agreement level among panellists of 100% (Table 1).

Finally, in our document we did not address non-neoplastic conditions of the nail, mucosae and hair and scalp as they have their own vocabulary and semiology.

In conclusion, the present expert consensus provides for the first time a set of standardized basic dermoscopic parameters to follow when assessing inflammatory, infiltrative and infectious dermatoses. Adopting a structured and uniform method to describe dermoscopic findings will allow procedures that are necessary to validate published data, such as comparison among different studies and assessment of reproducibility. This is particularly relevant for future studies on dermoscopy in general dermatology, which we strongly recommend to be designed on the basis of the tool that this consensus provides.

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Supporting Information

Table S1 Basic dermoscopic parameters selected in the expert consensus.