

Dermoscopy of Pigmented Skin Lesions*

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Summary

This paper describes the basic concepts of dermoscopy, the various dermoscopic equipment and the standard criteria for diagnosing pigmented skin lesions. In assessing dermoscopic images, both global and local features can be recognized. These features will be systematically described and illustrated in Part I of this article. First, we will focus on 8 morphologically rather distinctive global features that allow a quick, preliminary categorization of a given pigmented skin lesion. Second, we will describe various local features representing the letters of the dermoscopic alphabet. The local features permit a more detailed assessment of pigmented skin lesions.

Ia. BASIC ASPECTS

Dermoscopy (dermatoscopy, epiluminescence microscopy, incident light microscopy, skin surface microscopy) is a non-invasive diagnostic technique for the in vivo observation of pigmented skin lesions, allowing a better visualization of surface and subsurface structures. This diagnostic tool permits the recognition of morphologic structures not visible by the naked eye, thus opening a new dimension of the clinical morphologic features of pigmented skin lesions.

Previous studies have demonstrated that dermoscopy improves accuracy in diagnosing pigmented skin lesions. Reports assessing diagnostic accuracy by clinical examination have shown that dermatologists are able to detect melanoma in 65-80% of cases, depending on their expertise (1-3).

In a recent systematic review of dermoscopy accuracy in diagnosing melanoma, dermoscopy has been reported to allow 10-27% higher sensitivity than clinical diagnosis by the naked eye (4).

The technique consists in placing mineral oil, alcohol or even water on the skin lesion that is subsequently inspected using a hand-held lens, a hand-held scope (also called dermatoscope), a stereomicroscope, a camera, or a digital imaging system. The magnifications of these various instruments range from 6x to 40x and even up to 100x. The widely used dermatoscope has a 10-fold magnification permitting a sufficient assessment of pigmented skin lesions in daily routine. The fluid placed on the lesion eliminates surface reflection and renders the cornified layer translucent, thus allowing a better visualization of pigmented structures within the epidermis, the dermo-epidermal junction and the superficial dermis. Moreover, size and shape of vessels of the superficial vascular plexus can be easily appreciated by this procedure.

Ib. INSTRUMENTS

Diagnostic instruments commonly used for dermoscopic examination and image acquisition are summarized in Table 1 and described briefly below.

Dermatoscope

The dermoscopic examination can be carried out easily and rapidly with a hand-held dermatoscope providing intra- and sub-epidermal illumination. The spherical, achromatical lens is paired with a bright halogen beam allowing a 10-fold magnification with 100% viewing area in focus. It can be used with or without immersion oil.

Dermaphot

Dermaphot (Heine Optotechnik, Herrsching, Germany) is a specially designed lens that, mounted on a conventional or digital reflex camera, can take clinical macrophotographs as well as dermoscopic pictures at 10-fold magnification.

Stereomicroscope

The stereomicroscope is a binocular optical instrument providing high quality, three-dimensional visualization of epidermal and subepidermal structures. With the stereomicroscope various magnifications ranging from 6x to 40x can be easily used. The system includes three different light intensities and can be connected to a conventional or digital photcamera as well as to a videocamera for documenting images. A hand-held, portable stereomicroscope has been recently designed by J. F. Kreusch that is easier to use and less expensive.

Videodermatoscope

This instrument consists of a high-resolution color videocamera that is incorporated into the final part of a probe (with or without interchangeable objectives) allowing the indirect visualization of pigmented skin lesions on a monitor. The images can be easily digitized and stored using a personal computer connected to the system.

II. DERMOSCPIC CRITERIA

The dermoscopic diagnosis of pigmented skin lesions is based on various analytic approaches or algorithms that have been set forth in the last few years, such as pattern analysis (5,6), the ABCD rule (7), the Menzies' method (8), and the 7-point checklist (9). With each method the morphologic diagnosis of pigmented skin lesions is based on particular dermoscopic criteria.

In assessing dermoscopic images, both global and local features can be recognized (10). These will be displayed systematically in the following pages. First, we will focus on 8 morphologically rather distinctive global features that allow a quick, preliminary categorization of a given pigmented skin lesion. Second, we will describe various local features representing the letters of the dermoscopic alphabet. The local features permit a more detailed assessment of pigmented skin lesions.

Global Features

1. Reticular Pattern

Definition

The most common global feature in melanocytic lesions, the reticular pattern is characterized by a pigment network covering most parts of a given lesion. Basically, the pigment network appears as a grid of thin brown lines over a diffuse light brown background. Because the manifold modifications of the pigment network may vary with changes in the biologic behavior of melanocytic skin lesions, special interest will be paid to these variations.

Diagnostic significance

The reticular pattern represents the dermoscopic hallmark of benign acquired melanocytic nevi in general and thin melanomas in particular. A pigment network, however, is nearly always found in lentigo simplex, the precursor lesion of acquired melanocytic nevi (Clark nevus), as well as in solar lentigo, the precursor lesion of seborrheic keratosis. Moreover, a delicate pigment network is also frequently seen in dermatofibroma.

Pseudonetwork of the face

This type of pigment network is due to the particular anatomy of the facial skin that is devoid of rete ridges and is characterized by closely situated follicular infundibula. Thus, a diffuse pigmentation of the epidermis or the papillary dermis in facial skin reveals a peculiar pigment network, also called pseudonetwork of the face, that dermoscopically appears to be composed of round, equally sized meshes corresponding to the pre-existing follicular ostia. The recognition of the pseudonetwork of the face actually has no diagnostic significance, because it is found in solar lentigo, in the reticulated type of seborrheic keratosis, in Miescher nevus, and in melanoma in situ on severely sun-damaged skin (lentigo maligna). The distinction between these entities requires additional subtle criteria that will be addressed later.

2. Globular Pattern

Definition

The globular pattern is characterized by the presence of numerous, variously sized, round to oval structures with various shades of brown and gray-black coloration.

Diagnostic significance

A globular pattern is found in Clark nevi and also in Unna nevi, both belonging to the spectrum of acquired melanocytic nevi. Commonly a combination of the reticular and globular patterns is observed in Clark nevi and also in congenital nevi.

3. Cobblestone Pattern

Definition

Essentially, the cobblestone pattern is quite similar to the globular one but is composed of closely aggregated, larger, somehow angulated globules resembling a cobblestone.

Diagnostic significance

The cobblestone pattern is found in papillomatous dermal nevi (Unna nevus), in congenital nevi, and sometimes in the dermal part of compound Clark nevi.

4. Homogeneous Pattern

Definition

The homogeneous pattern appears as a diffuse, brown, gray-blue to gray-black or reddish-black pigmentation in the absence of a pigment network or other distinctive local features.

Diagnostic significance

The homogeneous pattern represents the morphologic hallmark of blue nevus, especially when predominantly of bluish coloration. However, it may also be present also in Clark nevi, dermal nevi, nodular and metastatic melanomas, thrombosed hemangiomas, subungual hematomas and subcorneal hemorrhages. In addition, this pattern may be occasionally found in pigmented basal cell carcinomas and in tattoos.

5. Starburst Pattern

Definition

The starburst pattern is characterized by the presence of pigmented streaks in a radial arrangement at the edge of a given pigmented skin lesion.

Diagnostic significance

The starburst pattern is stereotypical for Reed nevus, although a certain variability of this morphologic finding is common. Malignant melanomas, however, may sometimes display morphologic features closely resembling this starburst pattern, thus representing a major pitfall (false-negative cases).

6. Parallel Pattern

Definition

The parallel pattern is found exclusively in melanocytic lesions on glabrous skin of palms and soles due to particular anatomic structures inherent to this location. Remarkably, the pigmentation may follow the sulci as well as the cristae of glabrous skin, but they may be rarely arranged also at a right angle to these pre-existing structures.

Diagnostic significance

The parallel pattern and certain modifications of this pattern have been described as a particular dermoscopic finding of acral melanocytic lesions by Saida et al. (11) and Akasu et al. (12). In detail, the parallel-furrow pattern, the lattice-like pattern, and the fibrillar pattern are commonly found in acral melanocytic nevi, whereas the parallel-ridge pattern is highly suggestive for melanomas on acral sites, as recently outlined by Oguchi et al. (13) (Fig. 1).

7. Multicomponent Pattern

Definition

Basically, the multicomponent pattern is nothing but a combination of three or more distinctive dermoscopic structures within a given lesion. For instance, a multicomponent pattern may be made up of zones of pigment network, clusters of dots/globules, and areas of diffuse hyper- or hypopigmentation.

Diagnostic significance

The multicomponent pattern is highly suggestive of melanoma, but may be also frequently found in basal-cell carcinoma. Multicomponent patterns are rarely observed in acquired and congenital nevi or in other non-melanocytic lesions, such as seborrheic keratoses or angiokeratomas.

8. Unspecific Pattern

Definition

In some instances, a pigmented lesion cannot be categorized into one of the global patterns described above, because the overall morphologic aspect does not fit at all in these artificial, albeit rather distinctive categories. For this type of lesion the term "unspecific pattern" is used.

Diagnostic significance

Although the unspecific pattern has no real diagnostic implication, it is often associated with melanoma.

Local Features

1. Pigment Network

Definition

The pigment network appears as a delicate, regular grid of brownish lines over a diffuse light-brown background.

Histopathologic correlates

Histopathologically, the lines of the pigment network correspond to more or less pigmented and elongated rete ridges and the meshes of the network correlate to the dermal papillae. The appearance of the pigment network is thus determined by size and configuration of rete ridges (14).

Diagnostic significance

The pigment network represents the dermoscopic hallmark of melanocytic lesions independent of their biologic behavior. Remarkably, the assessment of the pigment network alterations is helpful for differentiating between benign and malignant melanocytic proliferations, especially when they are confined to the epidermis and superficial dermis.

Typical pigment network

A typical pigment network, a common finding in Clark nevus, is characterized by a light- to dark-brown pigmented, regularly meshed and narrowly spaced network distributed more or less regularly throughout the lesion and usually thinning out at the periphery. Obviously, there are many variations on the theme of typical pigment network reflecting the protean morphologic spectrum of

Clark nevus. In addition, a delicate typical pigment network is nearly always found in lentigo simplex, solar lentigo, and often also in dermatofibroma.

Atypical pigment network

An atypical pigment network is characterized by a black, brown, or gray, irregularly meshed network distributed more or less irregularly throughout the lesion and usually ending abruptly at the periphery. The lines of an atypical pigment network are often thickened. An atypical pigment network is a dermoscopic criterion with high specificity for the diagnosis of melanoma (Fig. 2).

2. Dots and Globules

Definition

Dots/globules are sharply circumscribed, usually round or oval, variously sized black, brown or gray structures. Basically, dots/globules may be subdivided due to their shape and distribution into regular and irregular ones. Irregular dots/globules are black, brown or gray, round to oval, variously sized and shaped structures unevenly distributed throughout a lesion.

Histopathologic correlates

Dots/globules correlate to aggregations of pigmented melanocytes, melanophages or even clumps of melanin within the cornified layer, the epidermis, the dermo-epidermal junction, or the papillary dermis. The size and shape of dots/globules reflects the extent and form of the accumulation of these pigmented structures, whereas their color depends on the level of these pigmented aggregates within the epidermis and the superficial dermis. Pigmented structures are black in the cornified layer, brown at the dermo-epidermal junction, and gray-blue in the papillary dermis. Stereotypical black dots correlate to focal collections of melanocytes and clumps of melanin within the stratum corneum. In contrast, classic brown globules correspond to either discrete junctional nests of more or less heavily pigmented melanocytes or to a cap-like pigmentation of melanocytes (nevus cells) in the papillary dermis immediately beneath the epidermis (14).

Diagnostic significance

Dots/globules may occur in benign and malignant melanocytic proliferations. In melanocytic nevi, regular dots/globules may be observed in the center but also throughout the lesion. They are regular in size and shape, and are quite evenly distributed. By contrast, in melanomas, irregular dots/globules occur predominantly at the periphery and vary in size and shape and are unevenly distributed (Fig. 3).

3. Streaks

Definition

Streaks are basically nothing but brownish-black linear structures of variable thickness, not clearly combined with pigment network lines. Streaks are regular or irregular, more or less converging, linear structures that may be observed throughout a lesion, but are more apparent when situated at the periphery. The term streaks includes radial streaming, radial streaks and pseudopods that, in our opinion, morphologically are just variations on the theme of streaks and, moreover, are basically similar from a histopathologic standpoint.

Histopathologic correlates

Streaks correlate with discrete nests of more or less heavily pigmented junctional nests of melanocytes independently of the cytomorphologic characteristics of the melanocytes within these nests. These pigmented, junctional nests of melanocytes form tubules parallel to the skin surface, giving rise to the long, linear shape of streaks. However, three-dimensional reconstruction will be needed to confirm this assumption.

Diagnostic significance

Although streaks are found in benign and malignant melanocytic skin lesions, the presence of irregular streaks strongly indicates malignancy, especially when the streaks are distributed unevenly throughout a given melanocytic lesion (Fig. 4). However, a symmetric, radial arrangement over an

entire lesion is particularly found in the pigmented spindle cell nevus of Reed. The architectural arrangement of streaks rather than the morphology of a single streak is crucial for the diagnosis.

4. Blue -whitish veil

Definition

Blue-whitish veil is a confluent, gray-blue to whitish-blue, diffuse pigmentation associated with pigment network alterations, dots/globules and/or streaks (Fig. 5).

Histopathologic correlates

The histopathologic correlate of blue-whitish veil is an acanthotic epidermis with compact orthokeratosis and more or less pronounced hypergranulosis usually overlying a large melanin-containing area such as confluent nests of heavily pigmented melanocytes in the upper dermis (14). This particular constellation of histopathologic findings may be observed in malignant melanomas but also in Spitz/Reed nevi.

Diagnostic significance

Blue-whitish veil, as defined above, is almost exclusively found in malignant melanomas and Spitz/Reed nevi. At least in our judgment, based on its pure dermoscopic appearance, no differentiation between the veil in melanomas and Spitz/Reed nevi is feasible. However, the presence of a blue-whitish veil is a helpful clue for distinguishing melanoma from Clark nevus since, as a rule, no blue-whitish veil is present in the latter.

5. Pigmentation

Definition

Pigmentation refers to a dark-brown to gray-black, diffuse area that precludes recognition of subtler dermoscopic features such as pigment network or vascular structures. Evidently, pigmentation is the dermoscopic criterion that may vary the most, as reflected by the many synonyms used for pigmentation, namely, irregular extensions, blotches and black lamella. We have grouped

pigmentation systematically as follows: localized regular, localized irregular, diffuse regular and diffuse irregular pigmentation.

Histopathologic correlates

The histopathologic correlates of the various forms of pigmentation correspond to otherwise dissimilar histopathologic structures that share pronounced melanin pigmentation throughout the different layers of the epidermis and/or upper dermis.

Diagnostic significance

Because of the variability of pigmentation its diagnostic significance is limited. Localized regular as well as diffuse regular pigmentations suggest benign lesions, whereas localized irregular and diffuse irregular pigmentations favor malignancy.

6. Hypopigmentation

Definition

Hypopigmentation refers to a localized or diffuse area of decreased pigmentation within an otherwise ordinary pigmented lesion. Localized hypopigmentation may be observed also in focal and multifocal variants.

Histopathologic correlates

The underlying histopathology of hypopigmentation is poorly understood, but obviously correlates with epidermal and dermal areas of decreased melanin pigmentation.

Diagnostic significance

Like pigmentation, the diagnostic significance of hypopigmentation is limited. The various kinds of hypopigmentation are commonly found within Clark nevi. In rare instances areas of irregularly outlined hypopigmentation may be observed also in melanomas.

7. Regression Structures

Definition

The fascinating biologic phenomenon of regression in melanoma is dermoscopically reflected by white areas, blue areas and a combination of both. White areas, formerly called white scar-like areas, are more or less well-circumscribed white zones resembling a superficial scar. Blue areas, synonymously named gray-blue areas, peppering, or multiple blue-gray dots, are small diffuse or speckled zones with a gray-blue or gray coloration (Fig. 6). A particular pitfall when assessing the so-called combinations of white and blue areas is the fact that this combination is virtually indistinguishable from the blue-whitish veil.

Histopathologic correlates

Histopathologically, regression of melanoma is characterized by fibrosis and/or variable amounts of melanophages within a thickened papillary dermis. So, white areas correspond to fibrosis and blue areas to melanosis (14). However, since fibrosis and melanosis are commonly found together, combinations of white and blue areas are often noted also dermoscopically.

Diagnostic significance

White areas, blue areas and especially the combination of both features are rather specific dermoscopic criteria for melanoma. However, regression structures may be occasionally found in Clark nevi and, in such cases, the differentiation from regressive melanoma may be difficult not only dermoscopically but also histopathologically. Regression structures, especially of the melanosis type, may be found in lichen planus-like keratosis or in pigmented actinic keratosis and may basically be indistinguishable from melanoma with regression.

8. Vascular Structures

Various distinctive vascular structures can be recognized when performing dermoscopy. These vascular structures have been originally classified by Kreusch and Koch (15) and recently modified by Argenziano et al. (16) as outlined in Table 2. For viewing vascular structures it is crucial to use only little compression of the tumor.

Local Features: Criteria for Non-Melanocytic Lesions

Milia-like cysts

Definition

Milia-like cysts are variously sized, white or white-yellowish, roundish structures.

Histopathologic correlates

Milia-like cysts correspond to intraepidermal horn globules, also called horn pseudocysts, representing a common histopathologic finding in acanthotic seborrheic keratosis.

Diagnostic significance

Milia-like cysts are predominantly found in seborrheic keratosis, but are sometimes present also in papillomatous dermal nevi (Unna nevi). Very rarely are a few milia-like cysts observed in melanomas.

Comedo-like openings

Definition

Comedo-like openings refer to brown-yellowish or brown-black, roundish to oval or even irregularly shaped, sharply circumscribed structures. The irregularly shaped comedo-like openings are also called irregular crypts.

Histopathologic correlates

Comedo-like openings correlate to keratin plugs situated within dilated follicular openings. Due to clumps of melanin and clusters of bacteria, these keratin plugs often have a yellowish-brown or dark-brown to black coloration. In seborrheic keratoses, and especially in papillomatous dermal nevi, keratin plugs may also accumulate between papillary exophytic structures then revealing an oval or even irregular shape.

Diagnostic significance

Comedo-like openings are predominantly found in seborrheic keratosis, but are observed also in papillomatous dermal nevi (Unna nevi).

Exophytic papillary structures

Definition

Exophytic papillary structures are densely packed dome-shaped structures, which are commonly separated by irregular, black comedo-like openings also known as irregular crypts.

Histopathologic correlates

Exophytic papillary structures correspond to finger-like projections reflecting pronounced papillomatosis and acanthosis in seborrheic keratoses or to digitiform papillations in papillomatous nevi containing nests of more or less pigmented melanocytes.

Diagnostic significance

Exophytic papillary structures are commonly found in papillomatous dermal nevi (Unna nevi) and also in seborrheic keratosis. They are very rarely observed in melanomas.

Red lacunas

Definition

Red lacunas appear as more or less sharply demarcated, roundish or oval areas with a reddish, red-bluish or dark-red to black coloration.

Histopathologic correlates

Red lacunas correspond to dilated vascular spaces situated in the upper dermis. Examples of red lacunas with dark-red to black coloration correspond to vascular spaces that are partially or completely thrombosed.

Diagnostic significance

Red lacunas are stereotypical features of hemangiomas and angiokeratomas. Variations on the theme of red lacunas may be occasionally found in subungual and subcorneal hematomas.

Leaf-like areas

Definition

Leaf-like areas are brown, brownish-gray to gray-black patches revealing a leaf-like configuration.

Some imagination is needed to recognize leaf-like structures when looking at these peculiar outlined areas.

Histopathologic correlates

Leaf-like areas correspond to more or less heavily pigmented, solid aggregations of basaloid cells in the papillary dermis of an otherwise typical superficial or nodular basal cell carcinoma.

Diagnostic significance

Leaf-like areas are a rather pathognomonic finding in pigmented basal cell carcinoma especially when associated with arborizing vessels. In some instances, a leaf-like pigmentation at the periphery of an otherwise 'featureless' melanoma may lead the diagnosis of pigmented basal cell carcinoma astray, thus representing a major pitfall (false-negative case).

Central white patch

Definition

The central white patch, a pathognomonic dermoscopic finding in dermatofibroma, is a relatively sharp circumscribed, round to oval, sometimes irregularly outlined, crystal-white area within the center of an otherwise regularly, light to dark-brown pigmented lesion. Occasionally, there are small round to oval-shaped, light brownish dots/globules within these central white patches.

Histopathologic correlates

Obviously, one may infer that the melanin pigmentation of the epidermal basal layer is reduced in the center of dermatofibromas with central white patches. However, we cannot explain lucidly the impact of the attachment of the fibrohistiocytic proliferation in a given dermatofibroma to the overlying epidermis with regard to this particular dermoscopic and clinical finding.

Diagnostic significance

Central white patches are nearly exclusively found in dermatofibromas representing the dermoscopic hallmark of this entity that, in our estimation, is often more easily diagnosed on clinical grounds.

Table 1 - Diagnostic instruments commonly used for dermoscopic examination and image acquisition

Instrument	Advantages	Disadvantages
Dermatoscope	- Easy to use - Low costs - By using a special lens also lesions located in particular anatomic sites (e.g. interdigital areas) can be observed	- Modification of luminous intensity and magnification not possible - Storage and retrospective analysis of the images and accurate patient follow-up not feasible - Close working distance
Dermaphot	- Easy to handle - High and standardized quality of the images	- Modification of luminous intensity and magnification not feasible
Stereomicroscope	- Excellent quality of visualization - Three-dimensional view - Various magnifications	- Handling time-consuming - Cumbersome equipment - High costs - Photography acquisition difficult
Videodermatoscope	- Easy handling requiring only some technical skills - Easy storage and retrieval of images for follow-up examinations - Teledermoscopic consultation feasible when connected to telematic networks	- Indirect view of the lesion - High costs

Table 2 – Vascular structures seen by dermoscopy and their diagnostic significance

Vascular structures	Diagnostic significance
Comma vessels	Mainly in melanocytic nevi, especially in dermal nevi; rarely in melanomas
Wreath vessels	Exclusively in sebaceous hyperplasias
Arborizing vessels	Commonly in basal cell carcinomas; rarely in nevi and melanomas and also in seborrheic keratoses
Hairpin vessels	Commonly in melanomas and seborrheic keratoses; sometimes also in basal cell carcinomas, keratoacanthomas and in melanocytic nevi
Dotted vessels	More or less common in all types of melanocytic tumors; sometimes also in seborrheic keratoses; rarely in basal-cell carcinomas
Linear irregular vessels	Relatively common in melanomas, especially when thicker than 0.75 mm; rarely in melanocytic nevi
Vessels within regression structures	Frequently within white areas of regressive melanomas

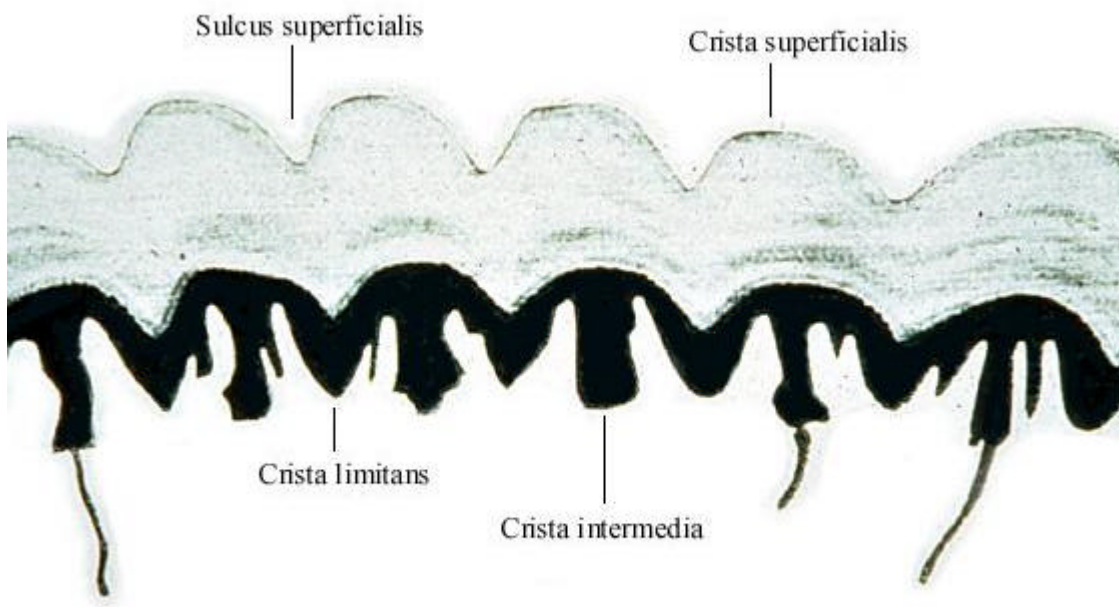


Fig. 1 - Schematic drawing of the anatomy of glabrous skin. The crista intermedia corresponds to the crista superficialis where the acrosyringium reaches the surface. The crista limitans corresponds to the sulcus superficialis. Nests of melanocytes situated around the crista limitans produce pigmentation following the sulcus superficialis, creating a dermoscopic pattern known as the parallel-furrow pattern. Pigmentation aligned along the cristae superficiales creates the parallel-ridge pattern, commonly found in melanoma in situ and early invasive melanomas of palms and soles.

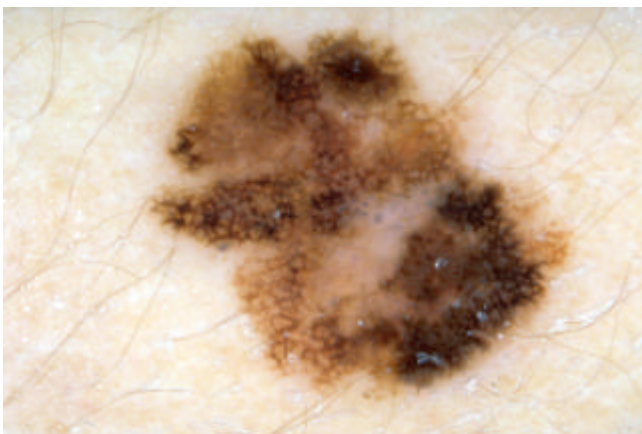


Fig. 2 – Melanoma with atypical pigment network (original magnification x10)

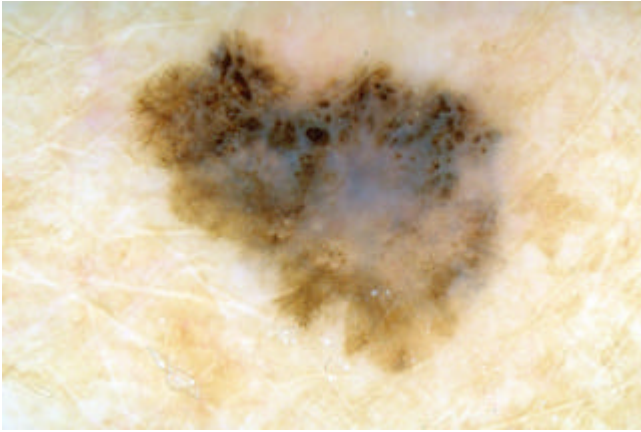


Fig. 3 – Melanoma with irregular dots/globules (original magnification x10)

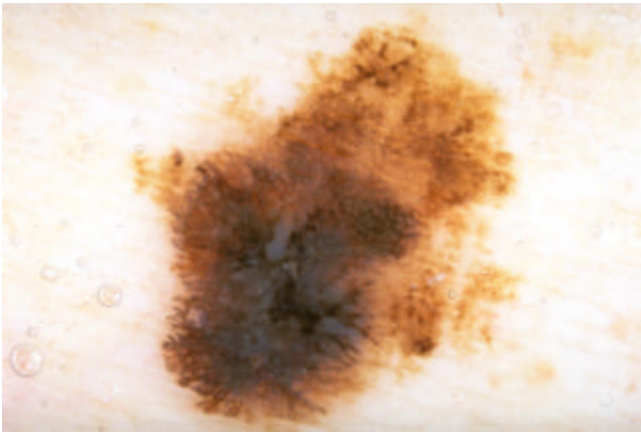


Fig. 4 – Melanoma with irregular streaks. Note the irregular distribution of bulbous and linear pigmented extensions at the edge of the lesion (original magnification x10).

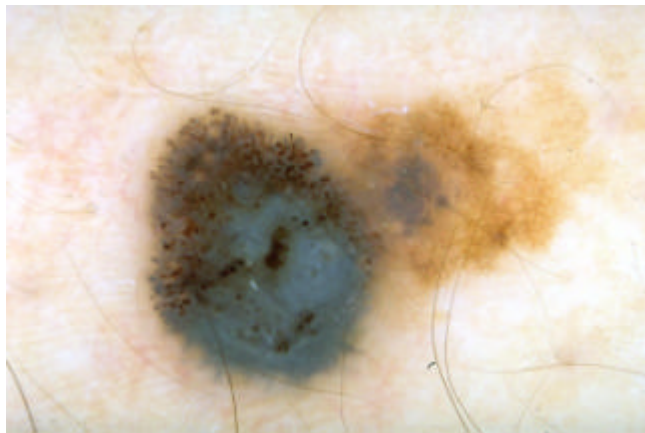


Fig. 5 – Melanoma with blue-whitish veil. Note atypical pigment network on the right side and irregular streaks and irregular dots/globules on the top left side of the lesion (original magnification x10).

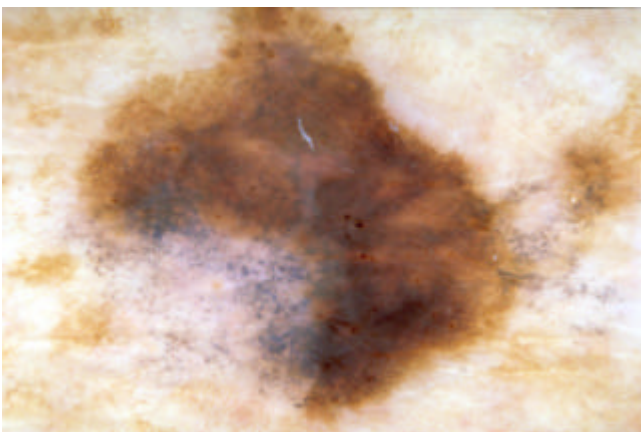


Fig. 6 – Melanoma with regression structures (white areas intermingled with blue, pepper-like areas) (original magnification x10).

Questions

1. Which is the most common global feature in melanocytic lesions?

- a. Reticular pattern
- b. Globular pattern
- c. Multicomponent pattern
- d. Cobblestone pattern

Answer: a

2. The starburst pattern is most frequently seen in:

- a. Melanoma
- b. Clark nevus
- c. Dermal nevus
- d. Spitz/Reed nevus

Answer: d

3. Dots/globules correlate histopathologically to aggregations of pigmented melanocytes, melanophages or even clumps of melanin within:

- a. The cornified layer
- b. The dermo-epidermal junction
- c. The papillary dermis
- d. All of the above

Answer: d

4. The histopathologic correlate of blue-whitish veil is:

- a. An acanthotic epidermis with compact orthokeratosis
- b. An acanthotic epidermis with compact orthokeratosis and more or less pronounced hypergranulosis usually overlying a large melanin-containing area
- c. More or less pronounced hypergranulosis usually overlying a large melanin-containing area
- d. Confluent nests of heavily pigmented melanocytes in the upper dermis

Answer: b

5. Regression structures can be seen in all of the following lesions except:

- a. Melanoma
- b. Clark nevus
- c. Hemangioma
- d. Lichen-planus like keratosis

Answer: c

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