Using dermoscopy to diagnose pigmented skin lesions

This article details a two-step method of diagnosing pigmented skin lesions using dermoscopy (surface microscopy).

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The technique

Dermoscopy (surface microscopy, epiluminescence microscopy) is a simple technique that uses a hand-held incident light magnification system (x10) to examine pigmented skin lesions, usually with liquid at the skin–microscope interface. The use of liquid removes the normal scattering of light at the surface of the skin, thus allowing the epidermis to become translucent. This, in addition to the magnification, allows visualisation of structures not visible with the naked eye (Figure 1). It results in a significant improvement in the ability to diagnose nearly all pigmented skin lesions.[1]

Many surface microscopes are now available commercially (e.g. Delta series Dermatoscope, Episcope). The majority use a glass plate and require liquid application over the lesion. This liquid can be mineral oil (e.g. 'baby oil'), liquid paraffin, ultrasound gel or a clear antiseptic solution such as 70% ethanol. The latter has the advantage of antisepsis with excellent clarity.[2]

Recently, hand-held surface microscopes using cross-polarised light have been developed that do not require the conventional glass plate–oil interface at the skin (e.g. DermLite). These instruments are very useful for examining the vascular structures of lesions because of the lack of compression seen with conventional devices. However, in my experience, some features, such as milia-like cysts, may not be visualised with these instruments. Hence, the remainder of this article refers to use with conventional glass plate surface microscopes.

Diagnostic improvement in primary care

Many studies have shown an improvement in the diagnosis of the majority of pigmented lesions when dermoscopy is used, including melanoma (reviewed in references 1 and 3). All of these studies, with the exception of one, occurred in a specialist setting. To show dermoscopy's impact in general practice, we performed a trial on GPs who were randomised to receive a dermoscopy education intervention or no intervention. This trial showed a 39% improvement in the sensitivity for the diagnosis of melanoma (compared with naked eye assessment) by the GPs receiving the intervention.[4] For this reason, it was concluded that all primary care physicians who practise in countries where melanoma causes significant mortality should learn dermoscopy.

IN SUMMARY

- **All primary care physicians who practise in countries where melanoma causes significant mortality should learn dermoscopy.**
- **Step 1 differentiates melanocytic lesions from nonmelanocytic lesions, and step 2 differentiates benign melanocytic lesions from melanoma.**
- **To differentiate benign melanocytic lesions from melanoma (step 2), look for negative and positive features; a melanoma will have neither of the two negative features and one or more of the positive features.**
- **The diagnostic sensitivity of dermoscopy is not 100%. The clinical history is also important in leading to a final diagnosis.**

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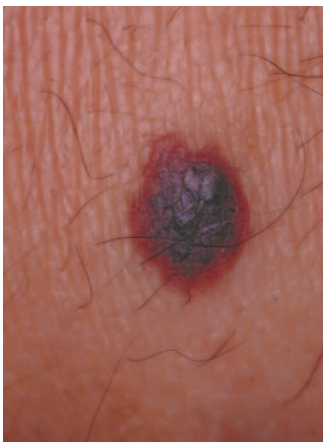

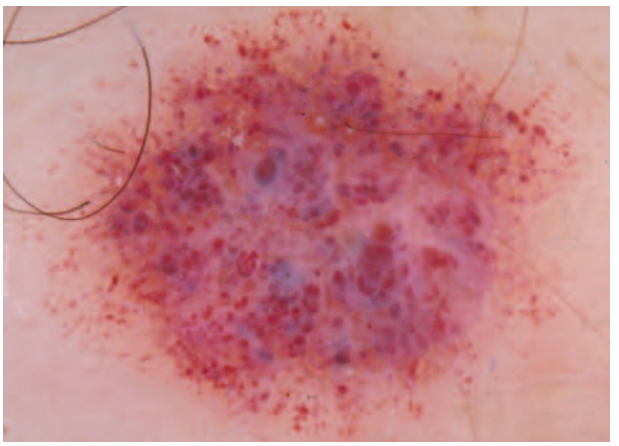

Figures 1a to c. a (left). Standard glass plate surface microscopes. Purchase of the microscope head alone reduces the cost if the ophthalmoscope/auroscope body (battery source) is already owned. b (centre). Clinical view of a pigmented lesion. c (right). Dermoscopy view. Here many new structures not visualised with the naked eye increases the diagnostic accuracy. Widespread red–blue lacunae (lakes) characterise this lesion as a haemangioma.

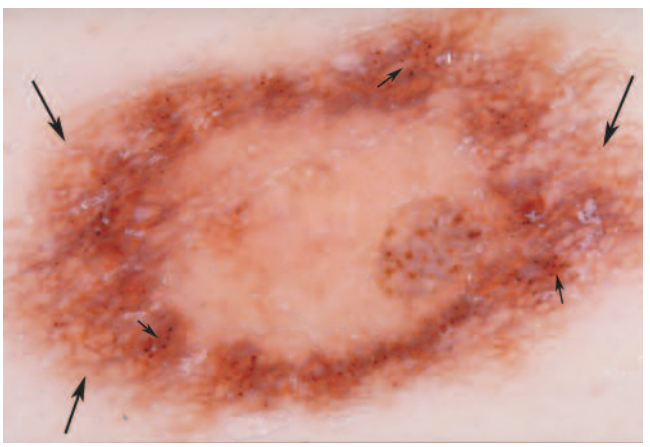

Figure 2. Dermoscopy showing a pigment network at the periphery of the lesion (long arrows) and scattered aggregated dark brown globules (thin arrows). Both are classic features of melanocytic lesions (lentigo, naevi and melanoma). Once a lesion is identified as melanocytic, then step 2 is performed to differentiate naevi from melanoma.

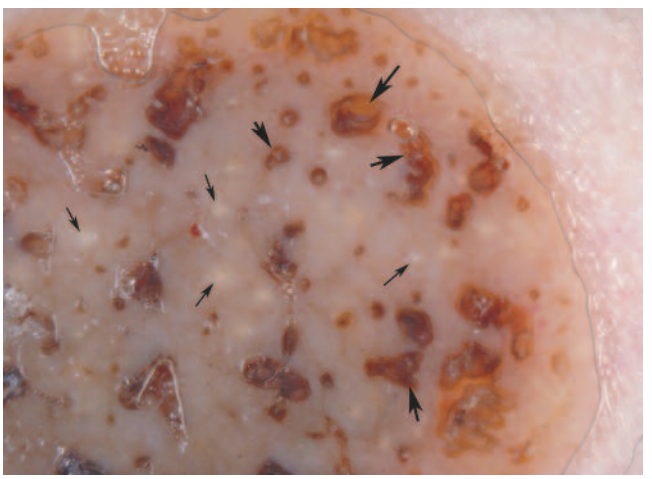

Figure 3. Dermoscopy showing irregular crypts (thick arrows) and multiple white or yellow milia-like cysts (thin arrows). Both features indicate the diagnosis of a seborrhoeic keratosis. An exception to this rule is that some congenital dermal naevi have these features.

Two-step procedure for diagnosing pigmented skin lesions[1,5]

In a recent international consensus statement on dermoscopy, a two-step method for diagnosing pigmented lesions was adopted and formally assessed.[5] Step 1 differentiates melanocytic lesions (e.g. lentigo, naevi and melanoma) from nonmelanocytic lesions (e.g. seborrhoeic keratoses, pigmented basal cell carcinomas and haemangiomas). If a melanocytic lesion is diagnosed in step 1, then step 2 – differentiating benign melanocytic lesions from melanoma – is performed.

Step 1. Melanocytic or nonmelanocytic lesions?

Melanocytic lesions

Any of the following dermoscopy features will indicate that a pigmented lesion is melanocytic (a lentigo, naevus or melanoma):

- pigment network (Figure 2)
- aggregated brown or black globules (Figure 2)
- streaks (pseudopods or radial streaming)
- homogeneous blue pigmentation (in blue naevi).

If any of these features are present, then one proceeds to step 2 (to differentiate benign lesions from melanoma).

Seborrhoeic keratoses

Any of the following indicate that a pigmented lesion is a seborrhoeic keratosis:

- multiple milia-like cysts (Figure 3)
- irregular crypts (Figure 3)
- fissures and/or ridges (Figure 4)
- light-brown fingerprint-like structures.

Pigmented basal cell carcinomas

A pigmented basal cell carcinoma must lack a pigment network and have one or more of:

- large blue–grey ovoid nests (Figures 5 and 6)
- multiple blue–grey globules
- maple leaf-like areas (Figure 5)
- spoke-wheel areas (Figure 6)
- arborising (tree-like) vessels (Figure 5)
- ulceration.

Haemangioma

A haemangioma can have one or both of the following:

- widespread red–blue lacunae (Figure 1c)
- red–blue to red–black homogeneous areas.

Step 2. Benign melanocytic lesions (naevi, lentigines) or melanoma?

Once a pigmented lesion has been identified as melanocytic in origin, or if it has none of the features of any class of lesion in step 1, you proceed to step 2.

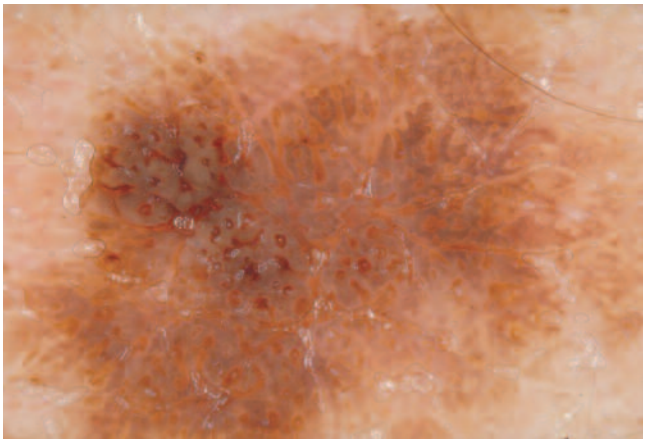

Figure 4. Dermoscopy showing widespread fissures and ridges indicative of a seborrhoeic keratosis.

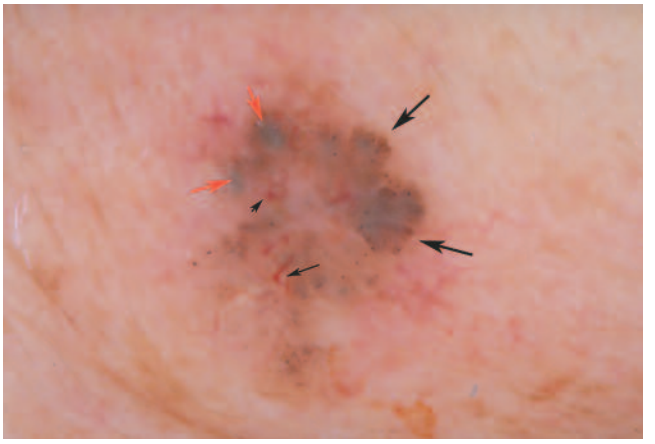

Figure 5. Dermoscopy showing a lesion without a pigment network and the positive features of arborising (tree-like branching) vessels (thin arrows), maple leaf-like areas (thick arrows) and large blue–grey ovoid nests (red arrows) indicative of a pigmented basal cell carcinoma.

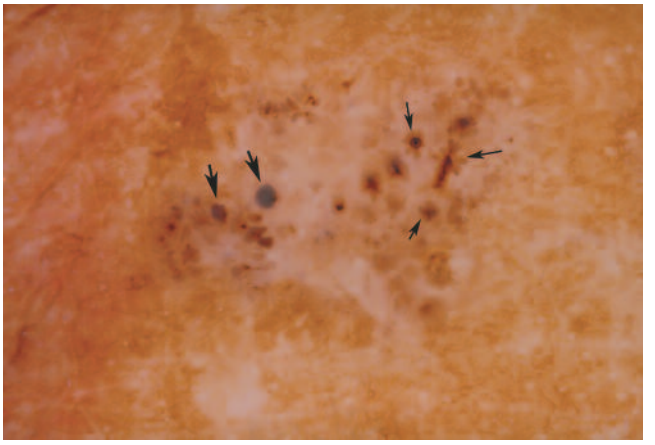

Figure 6. Dermoscopy showing a lesion without a pigment network and the positive features of large blue–grey ovoid nests (thick arrows) and spoke-wheel areas (thin arrows) indicative of a pigmented basal cell carcinoma.

Table. Using dermoscopy to differentiate melanoma from benign melanocytic lesions

Negative features (in melanoma neither can be found)

- Symmetry of pigmentation pattern
- Presence of only a single colour

Positive features (in melanoma at least one of these features is found)

- Blue–white veil
- Multiple brown dots
- Radial streaming
- Pseudopods
- Scar-like depigmentation
- Peripheral black dots or globules
- Multiple (five to six) colours
- Multiple blue–grey dots
- Broadened network

A number of well defined second step procedures suitable for inexperienced clinicians have been described.[6] In a recent comparison between three such methods, the following (Menzies' method) was found to be the most sensitive for the diagnosis of melanoma (i.e. highest percentage of melanomas correctly diagnosed).[5]

The method involves noting the absence or presence on dermoscopy of 'negative' and 'positive' features. These features are listed in the Table, and a brief description of each feature is given below. For a melanoma to be diagnosed, it must have neither of the two morphological negative features and one or more of the nine positive features. Ninety-two per cent of invasive melanoma can be diagnosed using the method. In addition, most *in situ* melanoma can also be

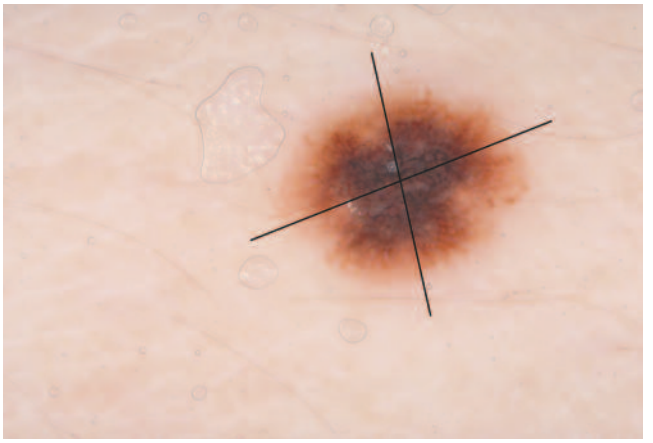

Figure 7. This lesion has one of the two negative features of melanoma – symmetry of pigmentation pattern. Once this negative feature is found, a diagnosis of a benign lesion can immediately be made. Symmetry of pigmentation pattern refers to symmetry of all pattern structures including colour along any axis through the centre of a lesion. Symmetry of shape is not required (although it is found here). The diagnosis was a compound naevus.

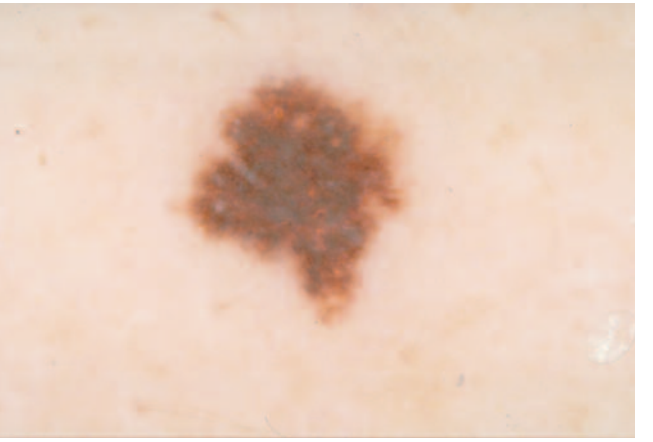

Figure 8. While this lesion has asymmetry of shape, it has a repeated pattern across any axis through its centre, hence it has symmetry of pigmentation pattern, and is immediately diagnosed as benign. Note that symmetry of pattern is never precise in biological material, rather it approximates the situation. If doubt exists whether a lesion has a symmetrical pattern, it is best to consider the lesion as asymmetrical. Diagnosis: dysplastic naevus.

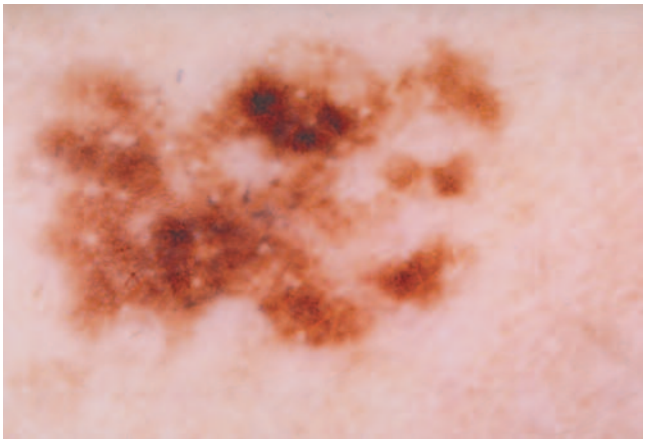

Figure 9. This lesion has more than one colour and asymmetry of pigmentation pattern (i.e. lacks both negative features, suggesting melanoma), but it has none of the positive features for diagnosing melanoma. Hence it is benign. However, this lesion shows moderate atypia and should be closely monitored (e.g. by digital computerised monitoring). Diagnosis: dysplastic naevus.

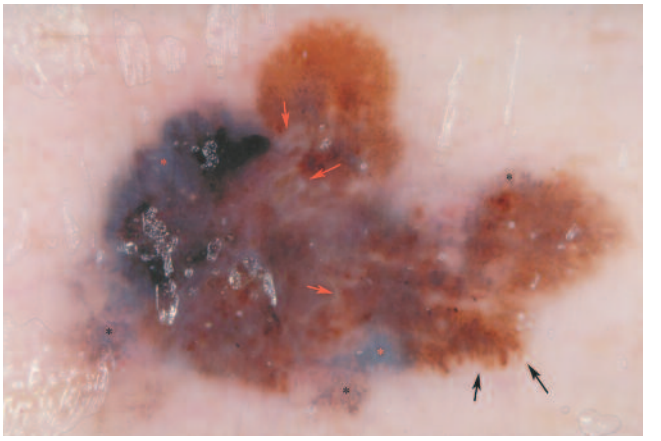

Figure 10. This lesion has more than one colour and asymmetry of pigmentation pattern and has the following positive features of melanoma: blue–white veil (red asterisks), multiple blue–grey dots (black asterisks), multiple (five to six) colours, radial streaming (black arrows) and scar-like depigmentation (red arrows). Diagnosis: invasive melanoma, Breslow thickness 1.3 mm.

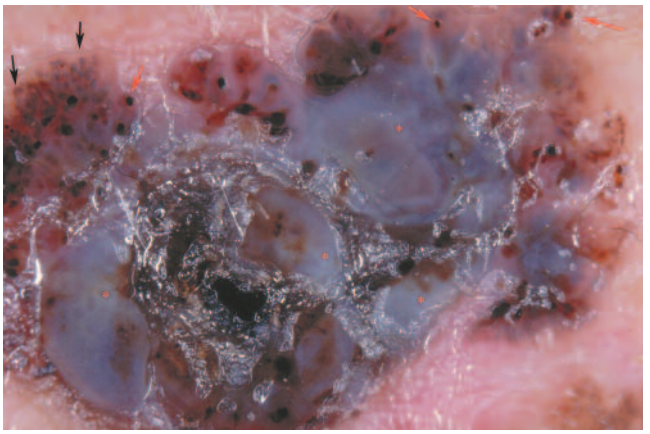

Figure 11. This lesion has more than one colour and asymmetry of pigmentation pattern and has the positive melanoma features of blue–white veil (red asterisks), pseudopods (black arrows), peripheral black dots and globules (red arrows) and multiple (five to six) colours. Diagnosis: invasive melanoma, Breslow thickness 1.8 mm.

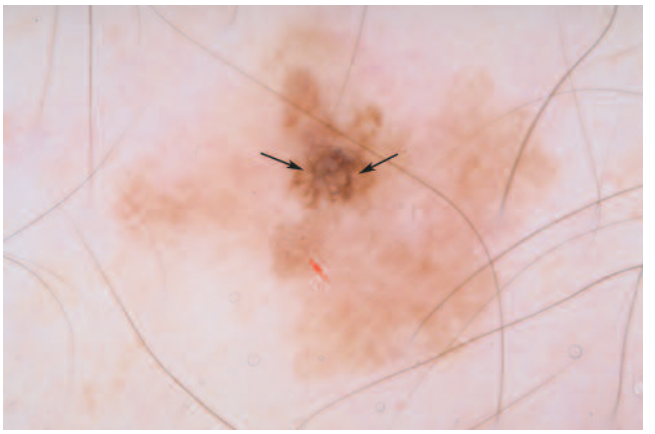

Figure 12. This lesion has more than one colour and asymmetry of pigmentation pattern and the positive melanoma feature of a broadened network (shown by the black arrows). A normal network is seen elsewhere in the lesion (red arrow). Diagnosis: invasive melanoma, Breslow thickness 0.6 mm.

detected. (Details of development of the method have been published elsewhere.[7] Also, an atlas has been produced describing the method in detail and including a CD quiz where over 200 examples of steps 1 and 2 are given.[1])

In this article, Figures 7 to 12 show examples of step 2 in use.

Negative features

For melanoma to be diagnosed, both of the following features must be absent.

Symmetry of pigmentation pattern

This refers to symmetry of all pattern structures including colour along any axis through the centre of a lesion (Figures 7 and 8). It does not require symmetry of shape. The presence of symmetry of pigmentation pattern is often the immediate defining feature of benign naevi (moles).

Single colour

The colours scored are black, grey, blue, red, dark brown and tan. A single colour excludes the diagnosis of melanoma.

Positive features

For melanoma to be diagnosed, at least one of the following features must be found. Figure 9 shows a lesion that, while lacking symmetry and having more than one colour, lacks any of the positive features and therefore is unlikely to be melanoma.

Blue–white veil

Blue–white veil refers to an irregular confluent blue pigmentation with an overlying 'ground glass' white film or 'veil' (Figures 10 and 11). It can never occupy the entire lesion as occurs with many blue naevi.

Multiple brown dots

These dark brown dots should be distinguished by their small size (dots rather than globules) and should be multiple and focal rather than scattered sparsely.

Radial streaming

Radial streaming manifests as finger-like projections at the edge of the lesion (Figure 10).

Pseudopods

Pseudopods are bulbous 'foot-like' projections at the edge of a lesion (Figure 11). They can arise from a pigmented network or solid pigmented border. Pseudopods should never occupy a uniform circumferential position in melanoma, as seen in some Spitz naevi.

Scar-like depigmentation

This is found in the chronic phase of regression, a common feature of superficial spreading melanoma. Scar-like depigmentation is seen as areas of pure white, well-defined, irregular extensions (Figure 10). Scar-like depigmentation can be distinguished from hypomelanotic areas commonly found in lesions because of the former's pure white colour and well-defined irregularly shaped borders.

Peripheral black dots or globules

These are found at or near the edge of the lesion (Figure 11). They are truly black in colour, in contrast to brown globules commonly found in benign lesions. They should also be distinguished from central black dots or globules, which are found in some dysplastic naevi.

Multiple (five to six) colours

To be a significant positive feature for melanoma, there must be at least five colours from a possible total of six: red, tan, dark brown, black, grey and blue (Figures 10 and 11).

Multiple blue–grey dots

In areas of regression of melanocytic lesions, melanin-laden macrophages (melanophages) can be found in the acute phase. These are seen as partly aggregated blue–grey dots, often described as 'pepper-like' in morphology (Figure 10). They are a common feature of lentigo maligna (*in situ* melanoma).

Broadened network

Broadened network describes an increase in the width of the 'grids' or 'cords' of the pigmented network found in melanocytic lesions (Figure 12). This broadening of the network is usually focally found in melanoma, rather than uniformly throughout the lesion. Broadened network is also a common feature of lentigo maligna.

Conclusion

Dermoscopy has been shown to significantly increase the diagnostic accuracy for primary melanoma in both experts and trained GPs. It should be understood that the diagnostic sensitivity of dermoscopy is not 100%, and that the clinical history is also important in leading to a final diagnosis. MT

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Acknowledgement

All the figures in this article are from: Menzies SW, Crotty KA, Ingvar C, McCarthy WH. An atlas of surface microscopy of pigmented skin lesions: dermoscopy. 2nd ed. Sydney: McGraw-Hill, 2003.

DECLARATION OF INTEREST: None.