

# Chaos: And the nine clues to suspicious pigmented lesions

**DERMATOLOGY**

Asymmetry and clues on dermatoscopy can provide a diagnosis, or support a clinical diagnosis, for a suspicious lesion.



Dermatologist **Amanda Oakley** presents examples showing the clues to malignancy

The first article about the “chaos and clues” dermatoscopic method was published in 2012 by Cliff Rosendahl and colleagues.<sup>1</sup> The method helps the observer to decide whether or not a lesion should be excised. It is based on modified pattern analysis, in which dermatoscopic features are described in terms of elements and patterns (see *New Zealand Doctor*, 3 February).

With certain exceptions, a malignant – or, at least, suspicious – pigmented skin lesion can be identified with confidence on dermatoscopy if it has:

- chaos, and
- one or more clues to malignancy.

Chaos is defined as asymmetry of structure/colour and two or more patterns.

The nine clues to malignancy are:

1. eccentric, structureless area
2. thick lines (reticular or branched)
3. grey or blue structures
4. black dots or clods (peripheral)
5. lines (radial) or pseudopods, segmental
6. white lines
7. polymorphous vessels
8. lines (parallel), ridges (palms or soles)
9. large polygons.

All 12 of the lesions pictured are at the same magnification (×10) and show chaos. They vary in size. Ignore the shape of the lesion.

- Each lesion has asymmetry of structure/colour in two axes.

- Colours are irregularly distributed across each lesion; colours include light brown, dark brown, black, grey, red and white.

- Structures are irregularly distributed across the lesion; structures include lines, dots, clods and structureless zones.

- The more chaotic, the more structures and the more colours are present, the more likely it is to be a malignant lesion.

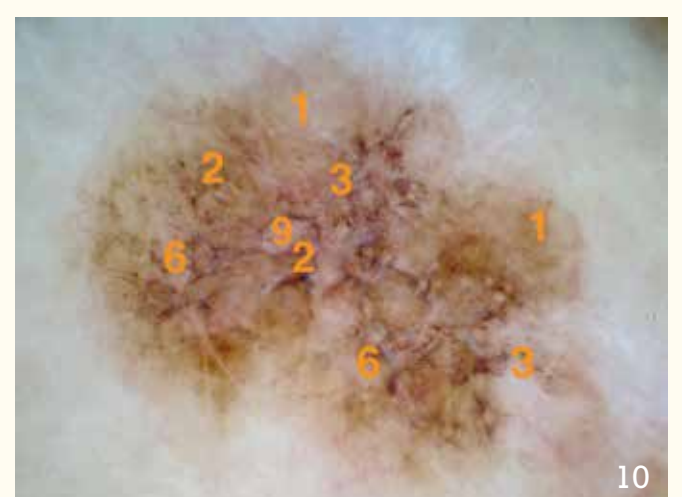
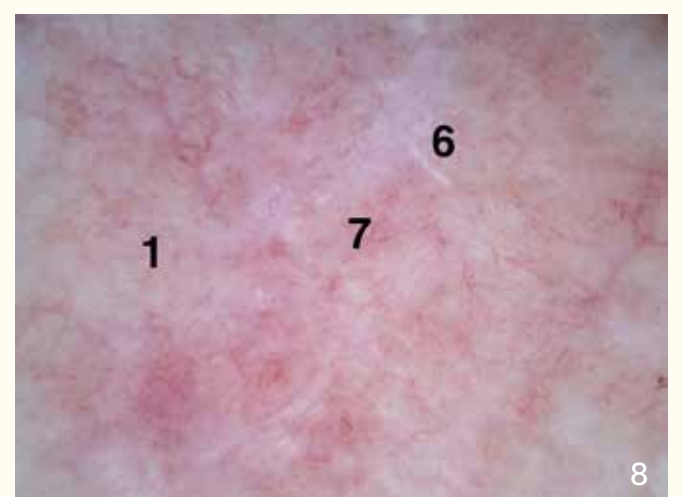
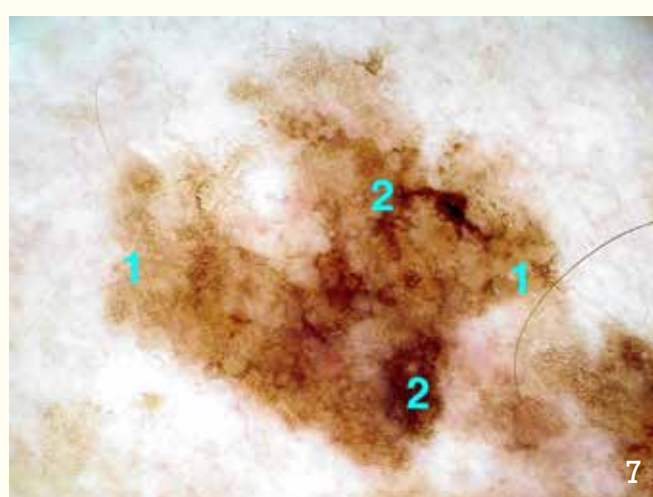
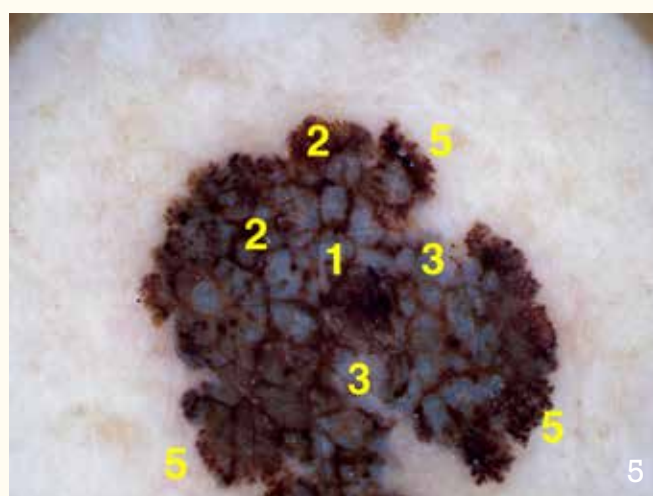
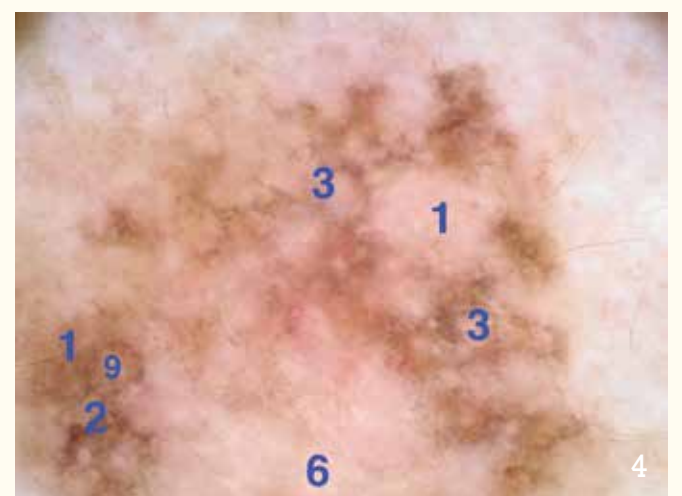
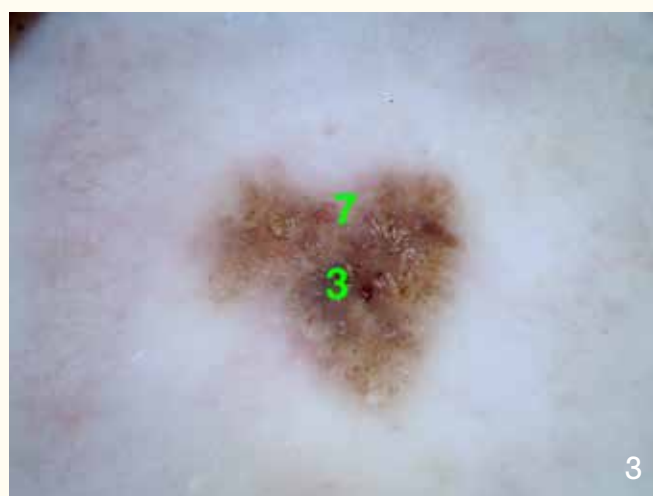
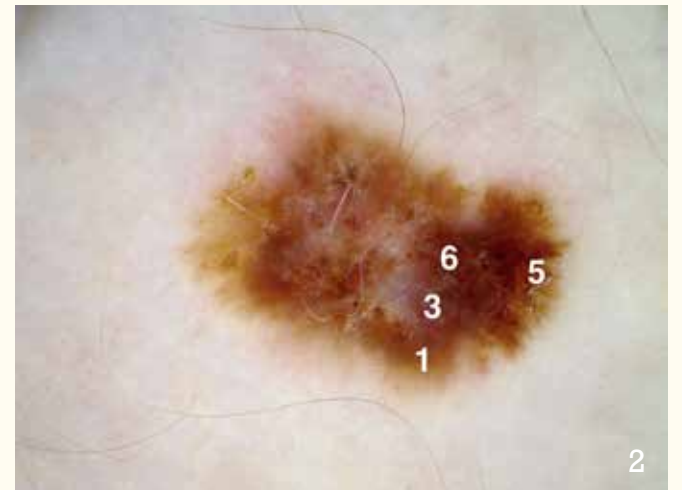
Indicated are one or more specific clues to malignancy on each image, and the histopathological diagnoses. Figures 3, 6 and 9 were not melanomas.

**Comments on the nine clues**

1. Eccentric structureless area
  - A central structureless area is not recorded, and is common in benign lesions.
  - The eccentric structureless area should be focal.
  - It can be any colour, apart from the colour of the surrounding skin.
  - Structureless areas occur in melanoma, pigmented basal cell carcinoma and pigmented intraepidermal carcinoma.

**DERMATOLOGY QUIZ ANSWERS**

1. 1.05mm acral lentiginous melanoma (see comments 1, 6, 7, 8)
2. 0.75mm melanoma (see comments 1, 3, 5, 6)
3. Seborrhoeic keratosis (see comments 3, 7)
4. Melanoma in situ (see comments 1, 2, 3, 6, 9)
5. Melanoma in situ (see comments 1, 2, 3, 5)
6. Pigmented basal cell carcinoma (see comments 1, 3, 5)
7. Melanoma in situ (see comments 1, 2)
8. Amelanotic melanoma in situ (see comments 1, 6, 7)
9. Atypical compound naevus (see comments ?1, ?2, ?3)
10. Melanoma in situ (see comments 1, 2, 3, 6, 9)

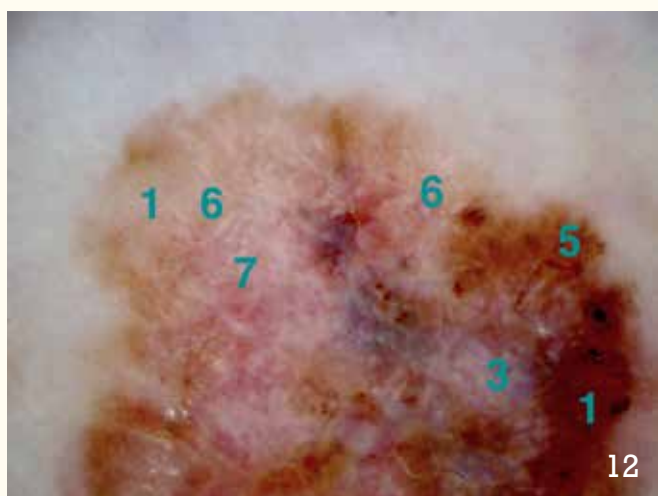






**DERMATOLOGY  
QUIZ ANSWERS**

- 11. 2mm spindle and epithelioid melanoma**  
(see comments 1, 3, ?4, 6)
- 12. 1.5mm melanoma**  
(see comments 1, 3, 5, 6, 7)



IMAGES WERE OBTAINED THROUGH WAIKATO HOSPITAL'S VIRTUAL LESION CLINIC, IN PARTNERSHIP WITH MOLEMAP NEW ZEALAND.

**2. Thick lines (reticular or branched)**

- Lines in benign lesions are thin, thinner than the spaces they enclose.
- Thick lines can be brown, black or grey.
- In melanoma, the thick lines are focal, variable and, often, indistinct.
- The thick lines are caused by bridging between rete ridges or destruction of the normal undulations of the epidermis.

**3. Grey or blue structures**

- Grey or blue structures are lines, circles, clods and dots.
- They are focal and irregularly distributed in melanoma, pigmented basal cell carcinoma and pigmented intraepidermal carcinoma.
- They are due to melanin in the papillary dermis, within neoplastic cells or melanophages.

**4. Black dots or clods (peripheral)**

- Black structures are due to very superficial melanin.
- Central black dots occur in some naevi.
- Peripheral black dots are due to pagetoid, intraepidermal spread of melanocytes, and are a reflection of expansion.

**5. Lines (radial) or pseudopods, segmental**

- Radial lines or pseudopods (radial lines with a clod on the end) reflect rapid growth.
- When present all around the circumference, a Reed naevus is likely.
- Focal radial lines converging centrally (like a fan or fingers) are typical of pigmented basal cell carcinoma.
- Segmental pseudopods are highly specific to melanoma, but uncommonly observed.
- White lines.

**6. White lines**

- White structures are whiter than the surrounding skin.
- White lines are often seen only on polarised dermatoscopy.
- They are often orthogonal, ie, perpendicularly orientated to each other.
- They represent fibrosis.
- They are typically seen in melanoma and basal cell carcinoma.
- White lines can also be reticular (inverse network).

**7. Polymorphous vessels**

- Vessels are seen in areas without pigment.
- Benign lesions tend to have a single

pattern of blood vessels, such as central dots, peripheral curved lines, small hairpins.

- Non-pigmented malignant lesions have linear and rounded vessels (red structures), often with unusual shapes and variable sizes.

**8. Lines (parallel), ridges (palms or soles)**

- Palms and soles have prominent ridges and furrows forming prints.
- Benign skin lesions tend to have more melanin pigment within the furrows.
- Melanoma tends to have more pigment on the ridges.
- Ridges are identified by the presence of eccrine openings (sweat pores), but these are not always easy to identify and can be destroyed in malignant tumours.

**9. Large polygons<sup>2</sup>**

- Angulated lines form complete or incomplete polygons (a many-sided geometric shape).
- Lines in facial melanoma form smaller, rhomboid structures.
- The lines are grey or brown.
- The lines may be composed of multiple fine dots.
- The lines are typically observed in melanoma in situ located in sun-damaged, non-facial, non-acral skin.

**If you cannot positively diagnose a benign lesion, cut it out or refer**



There are always exceptions to these rules. The main exceptions to the “chaos and clues” rules are:

- seborrhoeic keratoses often demonstrate chaos and clues – positively identify the stuck-on nature of the lesion, sharp borders, irregularly distributed orange clods and curved parallel lines
- solar lentigines can be irregular – a period of observation can be adopted for flat macules with mild atypia.

Do not observe enlarging nodules. If you cannot positively diagnose a benign lesion, cut it out or refer the patient to an expert.

If you are confident a lesion is a melanoma or a benign lesion, clinically, use dermatoscopic features to support the diagnosis. It isn't always easy

*Amanda Oakley is a specialist dermatologist practising in Hamilton at Waikato Hospital and Tristram Clinic. She is an honorary associate professor at Waikato Clinical School, and website manager for DermNetNZ.org*

**D** References are available under 'GP Resources' on [www.nzdoctor.co.nz](http://www.nzdoctor.co.nz)