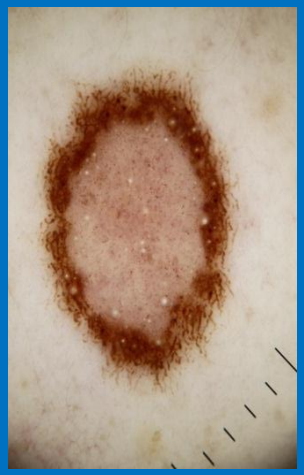
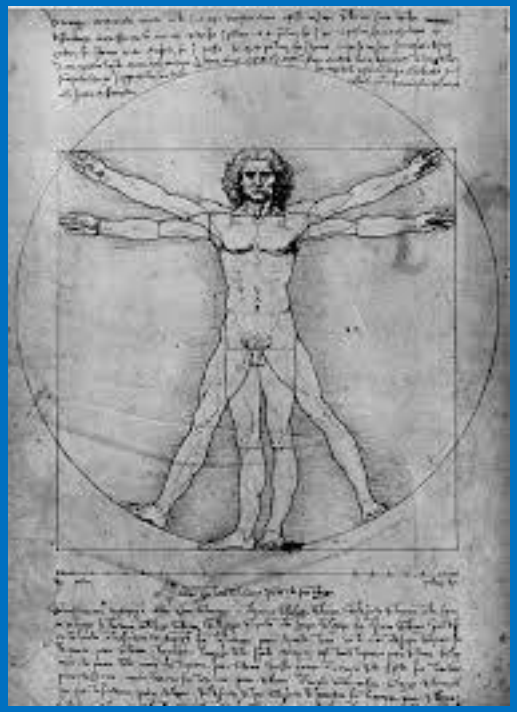
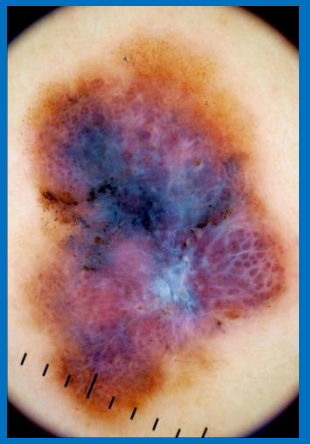
Chaos & Clues

Prediction without Pigment

Decision algorithms for skin lesions

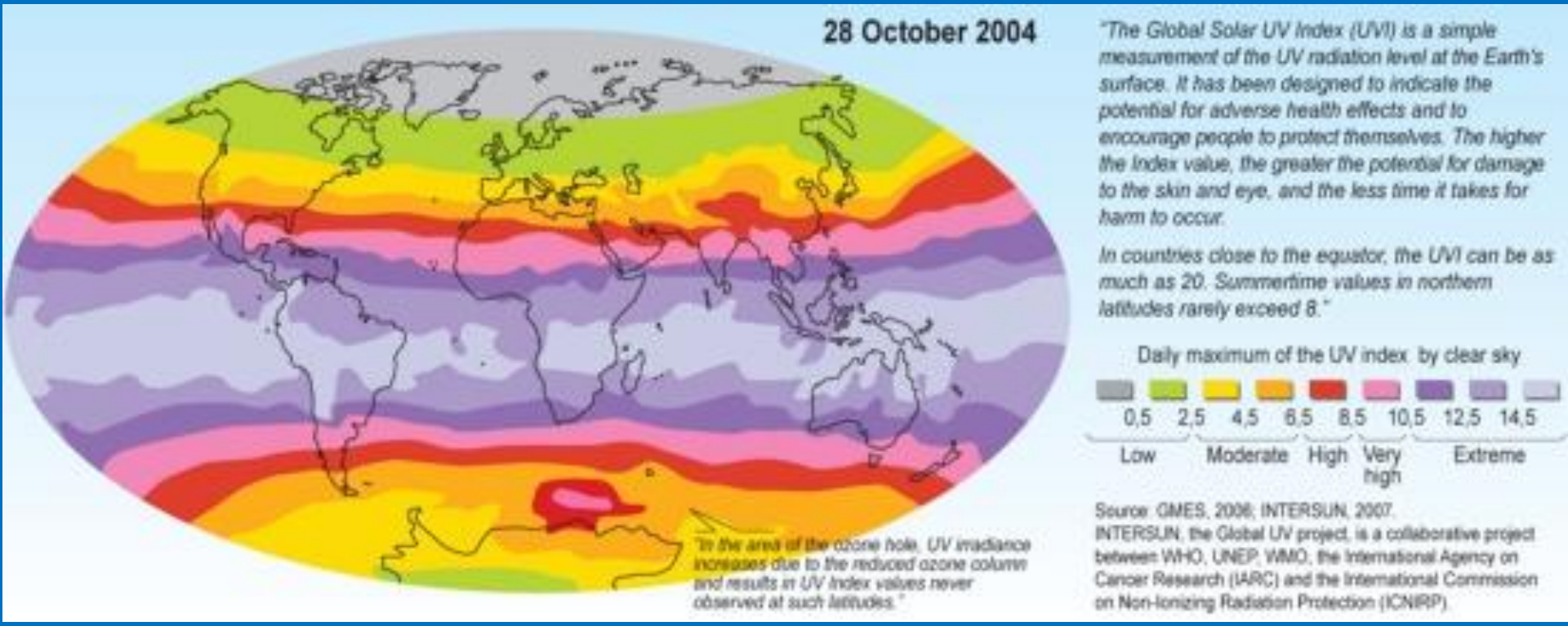






Cliff Rosendahl MBBS PhD
Associate Professor, School of Medicine
The University of Queensland, Australia


Arafura Sea
Solomon Sea
Timor Sea
Darwin
Northern Territory
Coral Sea
Queensland
Australia
Western Australia
Brisbane
South Australia
Perth
New South Wales
Sydney
Great Australian Bight
Adelaide
Canberra
Australian Capital Territory
Victoria
Melbourne
Tasmania
Hobart


28 October 2004
"In the area of the ozone hole, UV irradiance increases due to the reduced ozone column and results in UV index values never observed at such latitudes."
"The Global Solar UV Index (UVI) is a simple measurement of the UV radiation level at the Earth's surface. It has been designed to indicate the potential for adverse health effects and to encourage people to protect themselves. The higher the index value, the greater the potential for damage to the skin and eye, and the less time it takes for harm to occur.
In countries close to the equator, the UVI can be as much as 20. Summertime values in northern latitudes rarely exceed 8."
Daily maximum of the UV index by clear sky
0,5 2,5 4,5 6,5 8,5 10,5 12,5 14,5
Low
Moderate
High
Very high
Extreme
Source: GMES, 2006; INTERSUN, 2007.
INTERSUN, the Global UV project, is a collaborative project between WHO, UNEP, WMO, the International Agency on Cancer Research (IARC) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP)

Die Dermatoskopie. (1920)

Von Dr. **Johann Saphier.**

I. Mitteilung.

In den meisten dermatologischen Lehrbüchern finden wir ab und zu die Bemerkung, daß gewisse Merkmale einer Effloreszenz besonders deutlich unter Lupenvergrößerung auftreten. Seit jeher bedienen sich auch viele Dermatologen, besonders die Franzosen, verschiedener Lupen, deren Vergrößerungsvermögen allerdings in sehr engen Grenzen liegt. Es lag daher nahe, stärkere Vergrößerungssysteme anzuwenden, um mit ihnen die Haut in vivo zu betrachten. Solche Versuche dürften gelegentlich wohl häufiger unternommen worden sein, wie den flüchtigen Bemerkungen in den Arbeiten einzelner Autoren zu entnehmen ist; systematisch wurden sie jedoch nicht fortgesetzt.

Auch über die Aufhellung der Haut mit „Wasser oder Öl“ finden wir öfters Bemerkungen in der Literatur, ja sogar in Lehrbüchern. U. a. lesen wir im Grundriß der Dermatologie von Darier 1909 (deutsche Übersetzung von Zwick-Jadassohn 1912) im Kapitel über Lichen planus bei der Besprechung des Netzphänomens von Wickham folgendes: „Um es (das Netzphänomen) besser hervortreten zu lassen, ist es zweckmäßig, die Papeln mit Wasser oder Vaselinöl oder noch besser mit Anilinöl, das die Hornschicht transparent macht, zu befeuchten.“

In einer Arbeit von Unna über „Diaskopie der Hautkrankheiten“ (1893) setzt sich der Autor mit Kromayer über die Frage auseinander, welcher Teil der Epidermis die Durchleuchtung der Haut verhindert. Unna schreibt

- **Dermatology**
- **Dermatologists**
- **Dermatoscope**
- **Dermatoscopy**

Conflicts of Interest

(honorarium/expenses)

Presenter:

Skin Cancer College Australasia
Healthcert
Leo Pharma
University of California (Davis campus)
Dermatology Associates of Wisconsin
Sonic Health Care (Sullivan Nicolaides Pathology)
Cosmetic Surgery Forum
Derma Medical (MoleMax, DermLite)
EquipMed (MoleMax, DermLite)
HOTSPOTS Hawaii
International Dermoscopy Society

Conflict of interest…

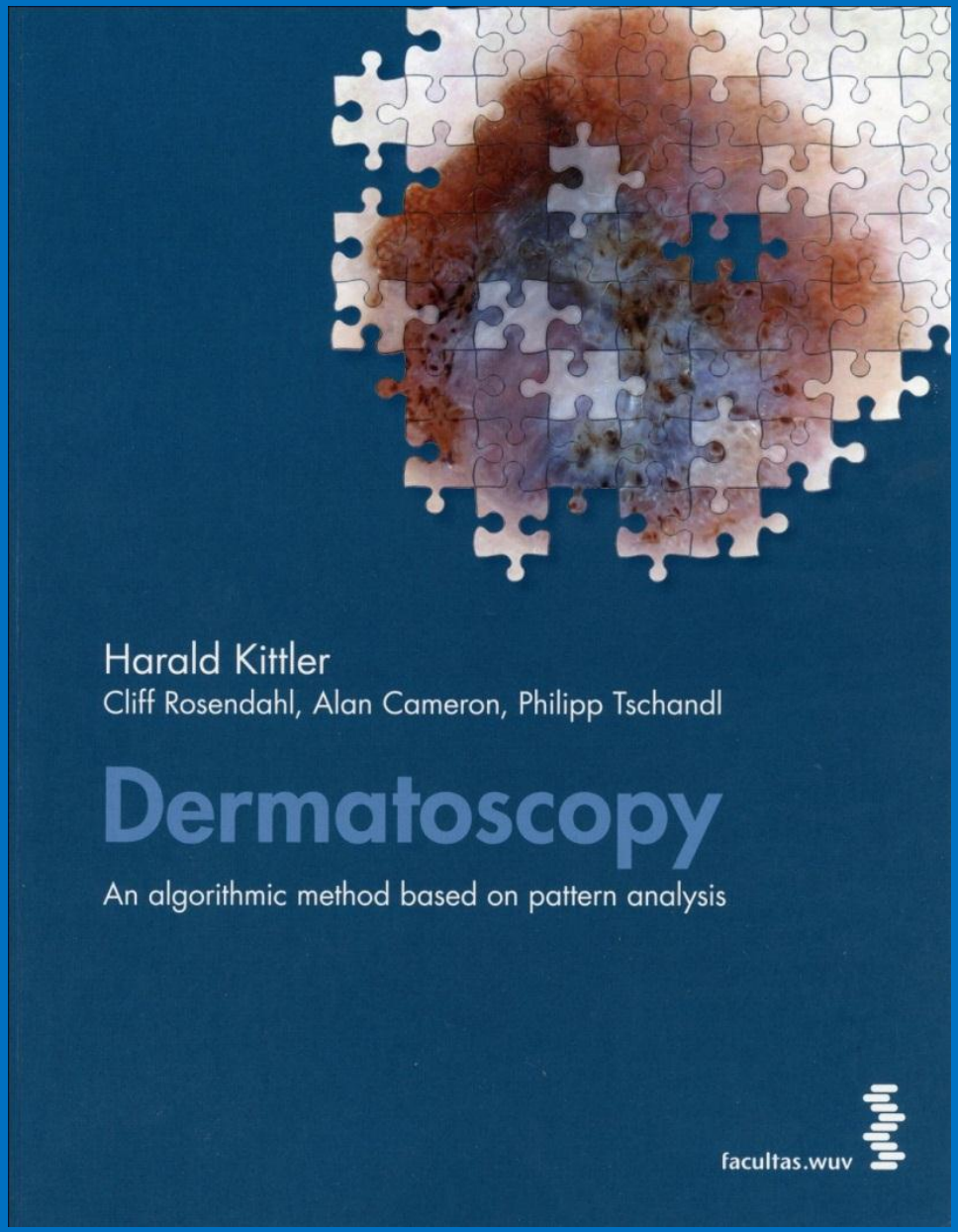
Director: Master of Medicine (Skin Cancer) Degree Program

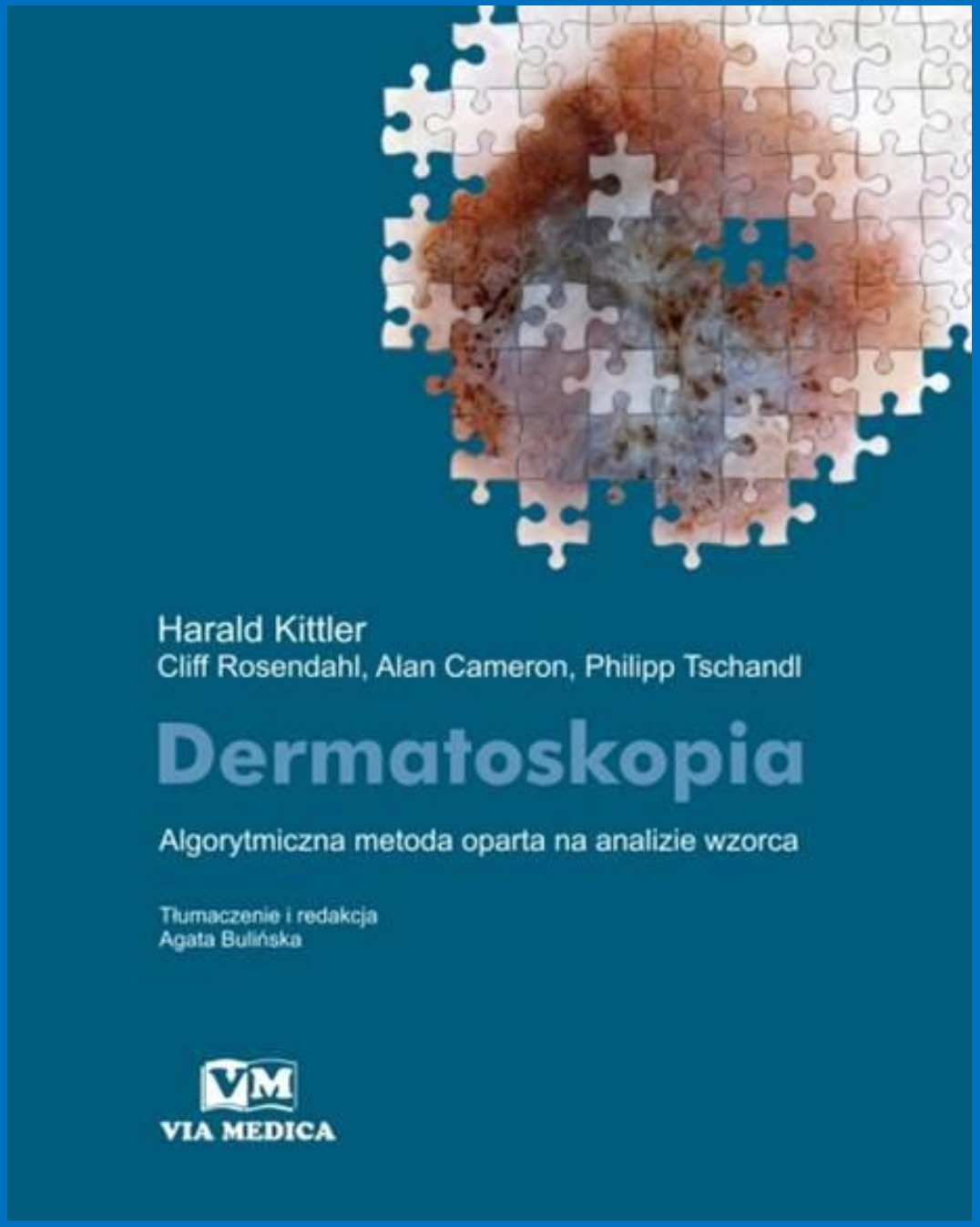
THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

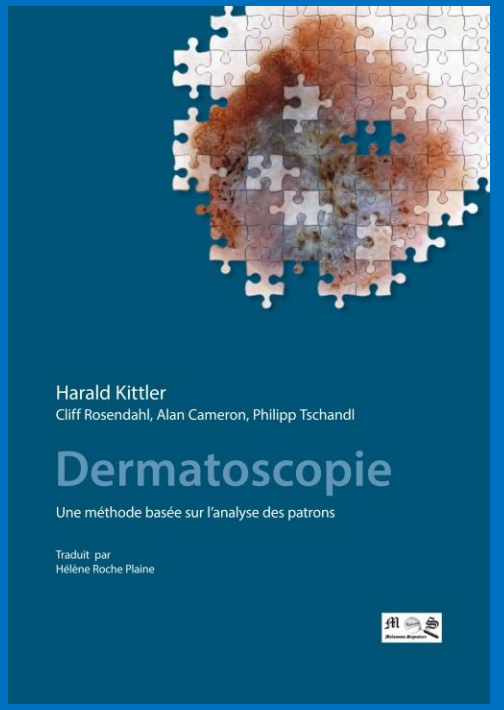
SCHOOL OF MEDICINE | AUSTRALIA'S GLOBAL MEDICAL SCHOOL www.som.uq.edu.au

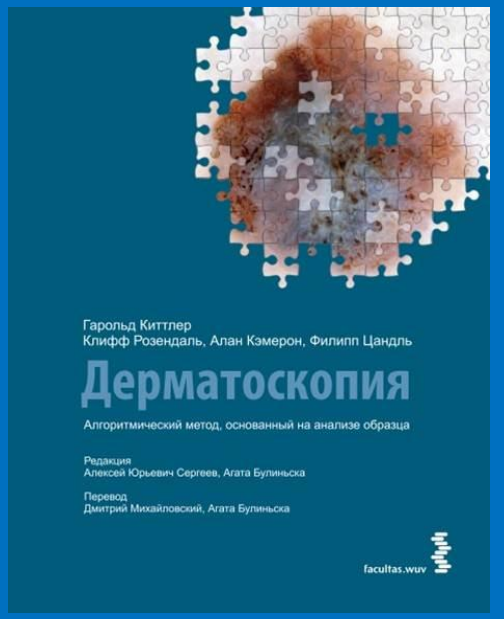
This post-graduate degree course awards a university-conferred post-nominal degree that can be placed after MD as MMed (Skin Cancer). It is open to any person with a basic medical degree. The course can be completed in one or two years, on-line, while continuing to work.
For more information email cliffrosendahl@bigpond.com

Conflict of interest…




Harald Kittler
Cliff Rosendahl, Alan Cameron, Philipp Tschandl
Dermatoskopia
Algorytmiczna metoda oparta na analizie wzorca
Tłumaczenie i redakcja
Agata Buliński
VM
VIA MEDICA


Harald Kittler
Cliff Rosendahl, Alan Cameron, Philipp Tschandl
Dermatoscopie
Une méthode basée sur l'analyse des patrons
Traduit par
Hélène Roche Plaine


Гарольд Киттлер
Клифф Розендаль, Алан Кэмерон, Филипп Цандль
Дерматоскопия
Алгоритмический метод, основанный на анализе образца
Редакция
Алексей Юрьевич Сергеев, Агата Булиньска
Перевод
Дмитрий Михайловский, Агата Булиньска
facultas.wuv

Conflict of interest…

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

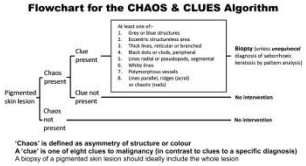
MEDIZINISCHE UNIVERSITÄT WIEN

CHAOS & CLUES

An Algorithm for the Diagnosis of Malignancy (any type) in Pigmented Skin Lesions by Dermatoscopy[1,2]

Cliff Rosendahl[a] Alan Cameron[a] Philipp Tschandl[b] Agata Bulinska[a] Jean-Yves Gourhant[c] Harald Kittler[b]

Flowchart for the CHAOS & CLUES Algorithm



'Chaos' is defined as asymmetry of structure or colour
A 'clue' is one of eight clues to malignancy (in contrast to clues to a specific diagnosis)
A biopsy of a pigmented skin lesion should ideally include the whole lesion

This algorithmic method is a diagnostic tool but no method, including this one, can be guaranteed to detect every malignancy

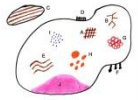
Revised Pattern Analysis[1,2]

Pattern + Colours + Clues = Diagnosis

A pattern is formed by multiple repetitions of basic structures

1. Is there one pattern or more than one pattern?
2. Is there one colour or more than one colour?
3. Are pattern and colours combined symmetrically or asymmetrically?
4. What is the differential diagnosis based on 1-3 above?
5. Are there clues to a specific diagnosis?

Basic Structures
Line - reticular (A), branched (B), parallel (C), radial (D) and curved (E): a two-dimensional continuous object with length greatly exceeding width, extending in one direction
Pseudopod (F): a line with a bulbous end
Circle (G): a curved line equidistant from a central point
Clod (H): any well circumscribed solid object larger than a dot, with any shape
Dot (I): an object too small to have a discernible shape
Structureless (J): an area with none of the basic structures dominating



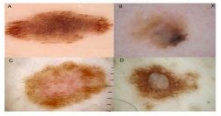
This is a diagrammatic representation of all of the basic structures in revised pattern analysis

Is there CHAOS?

CHAOS is defined as asymmetry of structure or colour. Irregularity of shape does not matter. Perfect symmetry is not expected in nature and is not required. Look at the overall pattern. With experience this can be assessed at **scanning** speed. There is no need to decide whether the lesion is melanocytic. If **CHAOS** is **not** present move to the next lesion. If **CHAOS** is present **STOP** and **EXAMINE** for one of 8 **CLUES** to malignancy.

Scan these four lesions for the presence of CHAOS (present in B). Note that D is symmetrical (by pattern and colour). Irregularity of shape does not matter.

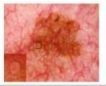
CHAOS



Exceptions

(Malignant lesions which sometimes don't exhibit CHAOS and for which (excision) biopsy should be considered)[2]

1. Changing lesions on adults with either historical or dermatoscopic evidence (peripheral clods, radial lines or pseudopods, even if circumferential).
2. Nodular lesions or very small lesions with any clue to malignancy.
3. Any lesion lesion on the head or neck with dermatoscopic grey colour.
4. Lesions on palms or soles (acral) with a parallel ridge pattern.

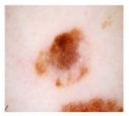


This is an example of a facial lentigo maligna with the CLUE of 'grey structures'(circles) but without CHAOS

CLUES

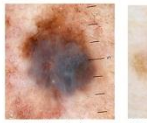
Is a CLUE to malignancy present?

1. Grey or Blue Structures
2. Eccentric Structureless Area
3. Thick Lines Reticular or Branched
4. Black Dots or Clods, Peripheral
5. Lines Radial or Pseudopods, Segmental
6. White Lines
7. Polymorphous Vessels[3]
8. Lines Parallel, Ridges (Palms or Soles) or Chaotic (Nails)

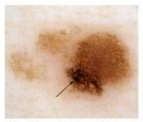


1. Grey dots (melanoma).

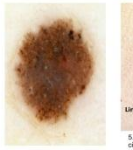
1. Grey or blue structures in a basal cell carcinoma (BCC).



2. Eccentric structureless area (any colour except skin colour) (Melanoma).



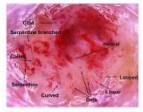
3. Thick lines reticular (arrow) (Melanoma).



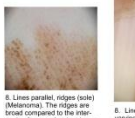
4. Black dots or clods, peripheral (Melanoma).

5. Lines radial or pseudopods; circumferential rather than segmental. On an adult excision biopsy would be indicated - see exception 2 (Reed naevus).

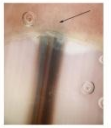
6. White lines are a clue to malignancy and 'perpendicular white lines polarising artefact' (right above) are a clue to malignancy (BCC and melanoma) and they also occur in dermatofibroma, Spitz naevus and pyogenic granuloma. This is an invasive melanoma.



7. Polymorphous vessels; although this BCC is not pigmented it is included here because it displays almost every vessel type.



8. Lines parallel, ridges (sole) (Melanoma). The ridges are broad compared to the intervening furrows. Acral melanoma can arise in a furrow-pattern naevus in which case chaos and other clues to malignancy are expected.

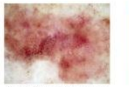


8. Lines parallel, chaotic (nail): varying in width, interval and colour. An arrow marks the location of a melanoma in the nail matrix (thumb) concealed by the proximal nail fold and nail plate.

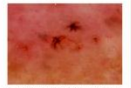
Specific Diagnosis of Pigmented Skin Malignancies

(Not critical because CHAOS & CLUES leads to biopsy anyway)

With very few exceptions the only malignancy with lines reticular is melanoma.

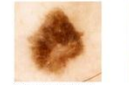


Absence of lines reticular gives a differential of all 3 pigmented malignancies. Serpentine vessels eliminate pigmented Bowen's disease (pBD) and a pattern of dot vessels eliminates BCC. This is a melanoma.

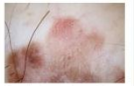


Lines radial, located centrally within a lesion and converging, are specific for BCC. They correspond to the so-called 'spoke-wheel structures' of metaphorical terminology.

In this BCC the lines radial converging, are located peripherally and segmentally and they are thick. This corresponds to the so-called 'leaf-like structures' of metaphorical terminology.



'One pattern structureless' is the most common pattern of pBD (present in 48%) and an eccentric hypo-pigmented structureless area is another common finding.[4]



Dots, either pigmented or as coiled vessels, arranged in lines, especially at the periphery, are a common feature of pBD (present in 21%).[4]

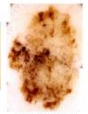
Exclusion of Seborrhoeic Keratoses by Pattern Analysis

Clues to Seborrhoeic Keratosis

1. Multiple orange clods
2. Multiple white clods
3. Thick curved lines
4. Sharply demarcated border over total periphery
5. Multiple grouped similar lesions

Remember: malignant lesions may have orange and white clods and melanomas may be located among grouped seborrhoeic keratoses. Weigh the clues. If clues to malignancy are present and the diagnosis of seborrhoeic keratosis is equivocal perform a biopsy!

Seborrhoeic keratosis

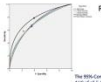


Invasive melanoma

Evaluation of CHAOS & CLUES

Assessment of 463 consecutive pigmented lesions – Dermatoscopy and Clinical diagnostic accuracy[5]
Cliff Rosendahl, Alan Cameron, Philipp Tschandl, Harald Kittler

Sensitivity (any malignancy): 90.6%
Specificity: 62.7%
If chaos and clues point to malignancy but seborrhoeic keratosis/solar lentigo/lichen-planus-like-keratosis (LPLK) can be diagnosed with confidence by pattern analysis:
Sensitivity (any malignancy): 90.6%
Specificity: 77.4%



The 95%-Confidence Intervals of the AUC of 3 Algorithms overlap. Therefore all algorithms, including the new short pattern analysis, are considered equal in diagnostic accuracy.

Assessment of 128 consecutive melanocytic lesions by 3 dermatoscopists comparing 3 point system, 7 point checklist, ABCD method, Menzies method and Chaos & Clues[6]
Philipp Tschandl, Alan Cameron, Cliff Rosendahl, Harald Kittler

Affiliations

(a) School of Medicine, The University of Queensland, Brisbane, Australia
(b) Department of Dermatology and Venereology, Medical University of Vienna, Austria
(c) Centre de Dermatologie, Nemours, France

Any method can miss malignancies. We recommend that this poster should be studied in conjunction with reference [2].
Electronic format (PDF) requests for this poster: **cliffrosendahl@bigpond.com**

References

(1) Kittler H. Dermatoscopy: Introduction of a new algorithmic method based on pattern analysis for diagnosis of pigmented skin lesions. Dermatopathology: Practical & Conceptual. 2007 13, 1.
(2) Kittler H, Rosendahl C, Cameron A, Tschandl P. Dermatoscopy 2011. Facultas.wuv Austria;
(3) Kittler H, Rosendahl C, Cameron A. Dermatoscopy of unpigmented lesions of the skin: a new classification of vessel morphology based on pattern analysis. Dermatopathology: Practical & Conceptual. 2008 14,4.
(4) Cameron A, Rosendahl C, Tschandl P, Reed E, Kittler H. Dermatoscopy of pigmented Bowen's disease. J Am Acad Dermatol 2010 April; 62(4): 597-604.
(5) Rosendahl C, Tschandl P, Cameron A, Kittler H. Diagnostic accuracy of dermatoscopy for melanocytic and nonmelanocytic pigmented lesions. J. Am. Acad. Dermatol. 2011 Jun;64(6):1068-73.
(6) Tschandl P, Cameron A, Rosendahl C, Kittler H. Presented at the 2nd International Congress of the International Dermoscopy Society, Barcelona, Spain, November 2009.

1-7-2013

MEDICINE

PREDICTION without PIGMENT

A Decision Algorithm for Non-Pigmented Skin Malignancy

Cliff Rosendahl[1], Alan Cameron[1], Agata Bulinska[1], Philipp Tschandl[2], Harald Kittler[2]

1. School of Medicine, The University of Queensland, Australia
2. Department of Dermatology and Venereology, Medical University of Vienna, Austria

The method presented here is a diagnostic tool, but no method, including this one, can be guaranteed to detect every malignancy
In particular, any Elevated, Firm, Growing (EFG) lesion should be excised[1]

Clues to Diagnosis

Although non-pigmented skin lesions lack clues of melanin structures, there are other useful non-vessel clinical and dermatoscopic clues that take priority.

Ulceration without a history of trauma should be regarded as a clue to malignancy. It is commonly present in BCC and even when not evident clinically it may often be identified by the presence of adherent fibre observed dermatoscopically.[2]

White clues* include dermatoscopic white lines as well as (in the case of raised lesions only) clues produced by keratin both on the surface of the skin (evident as scale) and beneath the stratum corneum where it appears in the form of dermatoscopic white circles and white structureless areas.[3] *For this purpose white clues do not include white dots or clods (so-called 'milia-like cysts') which can occur in malignant conditions but which are also common in seborrhoeic keratoses.*
Dermatoscopic white lines of any type, including perpendicular white lines (polarising-specific) are a clue to malignancy. Perpendicular white lines seen with polarised dermatoscopy are a published clue to BCC and melanoma as well as to the benign conditions Spitz naevus, DF, LPLK and scar tissue.[4] The authors have also seen them in IEC and PG.
White lines seen with non-polarising dermatoscopy can be a clue to both melanoma and BCC[2] but they also are not specific to malignancy.
In raised lesions, the keratin clues of dermatoscopic white circles, dermatoscopic white structureless areas and surface keratin are clues to SCC and KA.[3]
For the purpose of this algorithm a **raised lesion** is one with a significant visibly or palpably raised contour or with the dermatoscopic clue to a raised lesion of looped vessels.

Vessel type can be as dots, clods, linear, looped, curved, serpentine, helical or coiled and **vessel arrangement** can be random (non-specific), clustered, serpiginous, linear, centred, radial, reticular or branched.[2] A **monomorphous** vessel pattern consists of vessels of a single type sufficient to form a pattern. If there is more than a single vessel pattern or if more than one vessel type is present in significant quantities throughout the lesion in a speckled distribution the pattern is termed **polymorphous**.[5]

References

1. Chamberlain AJ, Fritschi L, Kelly JW. Nodular melanoma: patients' perceptions of presenting features and implications for earlier detection. J Am Dermatol 2003; 48:694-701.
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Abbreviations

BCC - Basal cell carcinoma
SCC - Squamous cell carcinoma
SK- Seborrhoeic keratosis
DF - Dermatofibroma
KA - Keratoacanthoma
IEC - Intra-epidermal carcinoma (Bowen's disease or SCC in situ)
LPLK - Lichen planus like keratosis
CCA - Clear cell acanthoma
PG - Pyogenic granuloma

If you cannot make a confident clinical diagnosis of solar or seborrhoeic keratosis, viral wart, dermal naevus or benign cyst then apply this algorithm:-

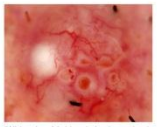
Prediction without Pigment - short version

Non-pigmented lesion
- Ulceration or white clues* present — **Consider Biopsy (exclude malignancy)**
- Ulceration or white clues* not present — **Apply vessel pattern analysis[2] (see below)**
  A polymorphous pattern including dots is strongly suspicious for melanoma
  A clods-only pattern, and in raised lesions a centred or serpiginous pattern, should be benign. All other patterns must be assessed for malignancy.

A **clods-only pattern** must have no vessels within the (red/purple) clods. A centred pattern must have vessels centred in **skin-coloured** clods.

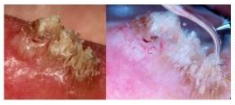
Prediction without Pigment - full version

Non-pigmented lesion
- Ulceration or white clues* present — **Consider Biopsy (exclude malignancy)**
  Ulceration: BCC, SCC, Melanoma
  White clues (lines): BCC, Melanoma, Spitz naevus, DF, LPLK, PG
  White clues (other): SCC/KA
- Ulceration or white clues* not present
  - Flat
    - Polymorphous vessels
      - Vessels as dots present — **Biopsy (exclude melanoma)**
      - Vessels as dots not present — BCC, IEC, SK, LPLK
    - Monomorphous vessels
      - Dots, serpentine or coiled — **Dots**: Melanocytic naevus, IEC, viral wart, inflammation/psoriasis **Serpentine**: BCC, scar **Coiled**: IEC, SK
      - Clods (red/purple) — **Clods: Haemangioma** (There must be no vessels within clods)
  - Raised
    - Vessel arrangement non-specific (random) (includes no vessels seen)
      - Not only clods — Melanoma BCC, SCC/KA, SK, PG
      - Only clods(red/purple) — **Haemangioma, haemorrhage** (There must be no vessels within clods)
    - Vessel arrangement specific
      - Radial or branched — **Radial**: KA/SCC, BCC with ulceration, sebaceous gland hyperplasia, molluscum **Branched:** BCC, SCC/KA, Merkel cell carcinoma, any raised cyst or neoplasm
      - Serpiginous or centred — **Serpiginous: CCA** **Centred: SK, viral wart, dermal naevus** (A centred pattern must be in **SKIN-COLOURED** clods)

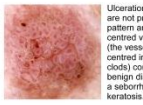


'White clues' (white circles in a raised lesion) are present so a decision to biopsy can be made without vessel pattern analysis. This is a dermatoscopic image of an SCC.

(Other specific vessel arrangements (clustered, linear and reticular) are not commonly encountered in a raised lesion and if present should be assessed as 'non-specific' for the purpose of this flowchart).



Clinical (left) and dermatoscopy (right) images of this lesion on an ear reveal that it is raised with 'white clues' of surface keratin and a white structureless area. It is an SCC.



Ulceration or 'white clues' are not present. Vessel pattern analysis reveals a centred vessel pattern (the vessels must be centred in **skin-coloured** clods) consistent with a benign diagnosis. This is a seborrhoeic keratosis.

There is no ulceration and no 'white clues'. The vessel pattern is **(red/purple)** clods-only consistent with the benign diagnosis of haemangioma. This pattern must not have any vessels within the clods to be interpreted as benign.

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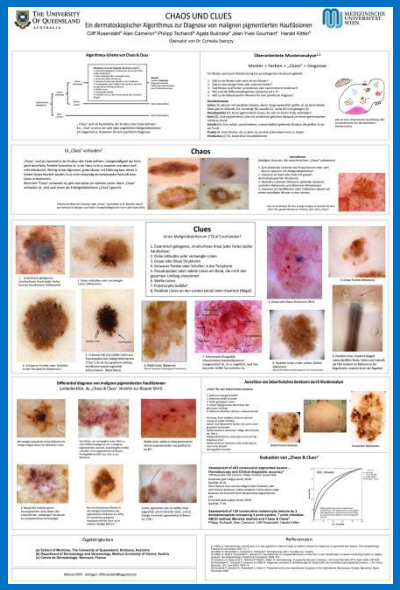

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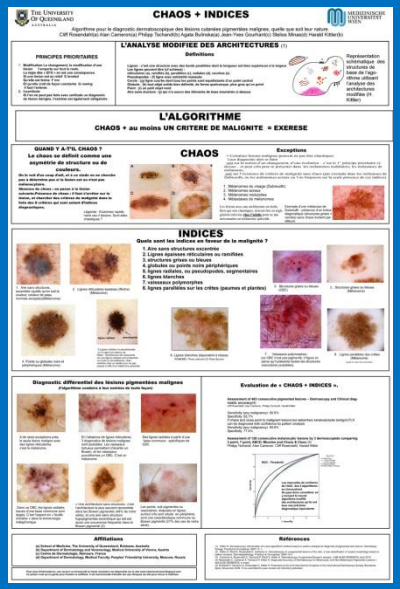
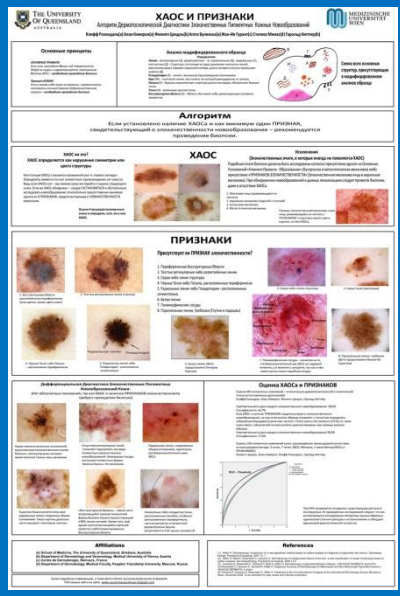


French



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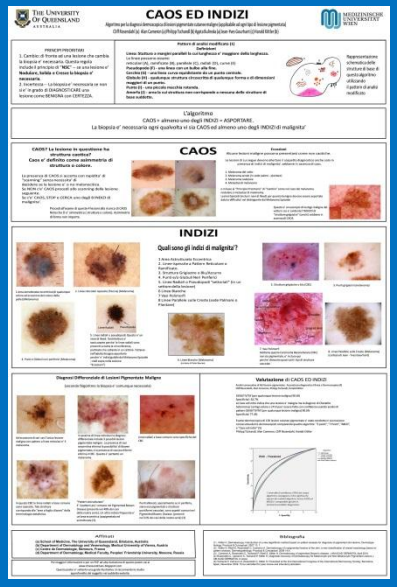
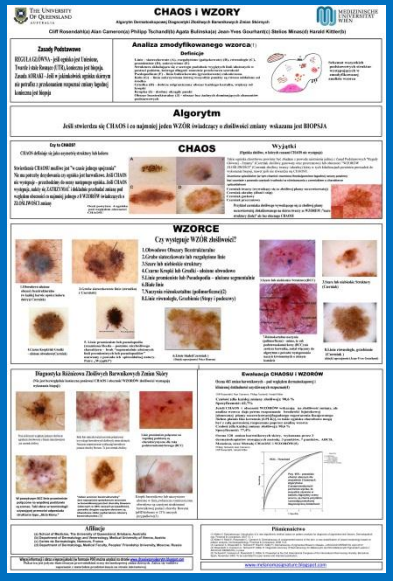
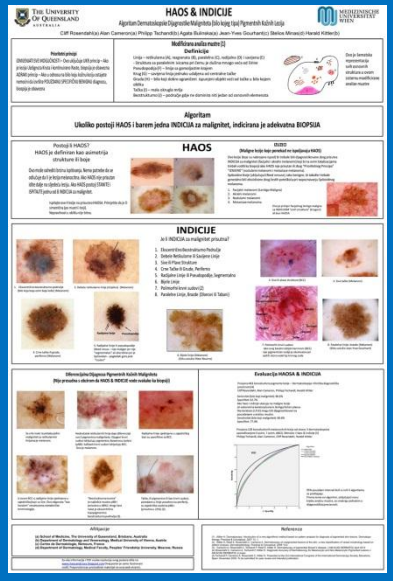


Italian

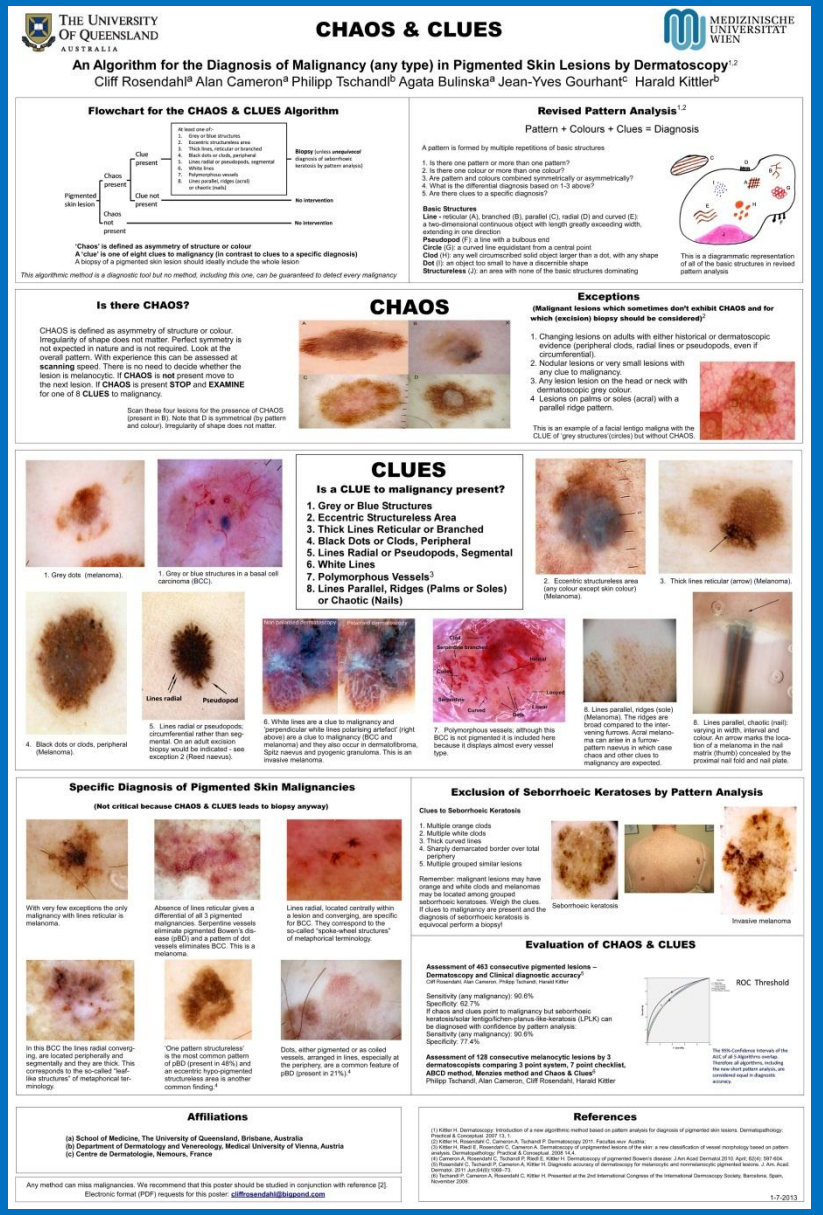


Polish



Serbo-Croatian

- ALL **pigmented** lesions
- Detects malignancy ANY type
- No need to decide whether melanocytic
- Can be applied at examination speed
- Efficacy similar to the other algorithms



THE UNIVERSITY OF QUEENSLAND AUSTRALIA

MEDIZINISCHE UNIVERSITÄT WIEN

CHAOS & CLUES

An Algorithm for the Diagnosis of Malignancy (any type) in Pigmented Skin Lesions by Dermatoscopy[1,2]

Cliff Rosendahl[a] Alan Cameron[a] Philipp Tschandl[b] Agata Bulinska[a] Jean-Yves Gourhant[c] Harald Kittler[b]

Flowchart for the CHAOS & CLUES Algorithm

Pigmented skin lesion → Chaos present → Clue present / Clue not present
Pigmented skin lesion → Chaos not present

At least one of:-
1. Grey or blue structures
2. Eccentric structureless area
3. Thick lines, reticular or branched
4. Black dots or clods, peripheral
5. Lines radial or pseudopods, segmental
6. White lines
7. Polymorphous vessels
8. Lines parallel, ridges (acral) or chaotic (nails)

Biopsy (unless unequivocal diagnosis of seborrhoeic keratosis by pattern analysis)

No intervention

No intervention

'Chaos' is defined as asymmetry of structure or colour
A 'clue' is one of eight clues to malignancy (in contrast to clues to a specific diagnosis)
A biopsy of a pigmented skin lesion should ideally include the whole lesion

This algorithmic method is a diagnostic tool but no method, including this one, can be guaranteed to detect every malignancy

Revised Pattern Analysis[1,2]

Pattern + Colours + Clues = Diagnosis

A pattern is formed by multiple repetitions of basic structures

1. Is there one pattern or more than one pattern?
2. Is there one colour or more than one colour?
3. Are pattern and colours combined symmetrically or asymmetrically?
4. What is the differential diagnosis based on 1-3 above?
5. Are there clues to a specific diagnosis?

Basic Structures
Line - reticular (A), branched (B), parallel (C), radial (D) and curved (E): a two-dimensional continuous object with length greatly exceeding width, extending in one direction
Pseudopod (F): a line with a bulbous end
Circle (G): a curved line equidistant from a central point
Clod (H): any well circumscribed solid object larger than a dot, with any shape
Dot (I): an object too small to have a discernible shape
Structureless (J): an area with none of the basic structures dominating

This is a diagrammatic representation of all of the basic structures in revised pattern analysis

Is there CHAOS?

CHAOS is defined as asymmetry of structure or colour. Irregularity of shape does not matter. Perfect symmetry is not expected in nature and is not required. Look at the overall pattern. With experience this can be assessed at **scanning** speed. There is no need to decide whether the lesion is melanocytic. If **CHAOS** is **not** present move to the next lesion. If **CHAOS** is present **STOP** and **EXAMINE** for one of 8 **CLUES** to malignancy.

Scan these four lesions for the presence of CHAOS (present in B). Note that D is symmetrical (by pattern and colour). Irregularity of shape does not matter.

CHAOS

Exceptions

(Malignant lesions which sometimes don't exhibit CHAOS and for which (excision) biopsy should be considered)[2]

1. Changing lesions on adults with either historical or dermatoscopic evidence (peripheral clods, radial lines or pseudopods, even if circumferential).
2. Nodular lesions or very small lesions with any clue to malignancy.
3. Any lesion lesion on the head or neck with dermatoscopic grey colour.
4. Lesions on palms or soles (acral) with a parallel ridge pattern.

This is an example of a facial lentigo maligna with the CLUE of 'grey structures'(circles) but without CHAOS.

CLUES

Is a CLUE to malignancy present?

1. Grey or Blue Structures
2. Eccentric Structureless Area
3. Thick Lines Reticular or Branched
4. Black Dots or Clods, Peripheral
5. Lines Radial or Pseudopods, Segmental
6. White Lines
7. Polymorphous Vessels[3]
8. Lines Parallel, Ridges (Palms or Soles) or Chaotic (Nails)

1. Grey dots (melanoma).

1. Grey or blue structures in a basal cell carcinoma (BCC).

2. Eccentric structureless area (any colour except skin colour) (Melanoma).

3. Thick lines reticular (arrow) (Melanoma).

4. Black dots or clods, peripheral (Melanoma).

5. Lines radial or pseudopods: circumferential rather than segmental. On an adult excision biopsy would be indicated - see exception 2 (Reed naevus).

6. White lines are a clue to malignancy and 'perpendicular white lines polarising artefact' (right above) are a clue to malignancy (BCC and melanoma) and they also occur in dermatofibroma, Spitz naevus and pyogenic granuloma. This is an invasive melanoma.

7. Polymorphous vessels; although this BCC is not pigmented it is included here because it displays almost every vessel type.

8. Lines parallel, ridges (sole) (Melanoma). The ridges are broad compared to the intervening furrows. Acral melanoma can arise in a furrow-pattern naevus in which case chaos and other clues to malignancy are expected.

8. Lines parallel, chaotic (nail): varying in width, interval and colour. An arrow marks the location of a melanoma in the nail matrix (thumb) concealed by the proximal nail fold and nail plate.

Specific Diagnosis of Pigmented Skin Malignancies

(Not critical because CHAOS & CLUES leads to biopsy anyway)

With very few exceptions the only malignancy with lines reticular is melanoma.

Absence of lines reticular gives a differential of all 3 pigmented malignancies. Serpentine vessels eliminate pigmented Bowen's disease (pBD) and a pattern of dot vessels eliminates BCC. This is a melanoma.

Lines radial, located centrally within a lesion and converging, are specific for BCC. They correspond to the so-called "spoke-wheel structures" of metaphorical terminology.

In this BCC the lines radial converging, are located peripherally and segmentally and they are thick. This corresponds to the so-called "leaf-like structures" of metaphorical terminology.

'One pattern structureless' is the most common pattern of pBD (present in 48%) and an eccentric hypo-pigmented structureless area is another common finding.[4]

Dots, either pigmented or as coiled vessels, arranged in lines, especially at the periphery, are a common feature of pBD (present in 21%).[4]

Exclusion of Seborrhoeic Keratoses by Pattern Analysis

Clues to Seborrhoeic Keratosis

1. Multiple orange clods
2. Multiple white clods
3. Thick curved lines
4. Sharply demarcated border over total periphery
5. Multiple grouped similar lesions

Remember: malignant lesions may have orange and white clods and melanomas may be located among grouped seborrhoeic keratoses. Weigh the clues. If clues to malignancy are present and the diagnosis of seborrhoeic keratosis is equivocal perform a biopsy!

Seborrhoeic keratosis

Invasive melanoma

Evaluation of CHAOS & CLUES

Assessment of 463 consecutive pigmented lesions – Dermatoscopy and Clinical diagnostic accuracy[5]
Cliff Rosendahl, Alan Cameron, Philipp Tschandl, Harald Kittler

Sensitivity (any malignancy): 90.6%
Specificity: 62.7%
If chaos and clues point to malignancy but seborrhoeic keratosis/solar lentigo/lichen-planus-like-keratosis (LPLK) can be diagnosed with confidence by pattern analysis:
Sensitivity (any malignancy): 90.6%
Specificity: 77.4%

Assessment of 128 consecutive melanocytic lesions by 3 dermatoscopists comparing 3 point system, 7 point checklist, ABCD method, Menzies method and Chaos & Clues[6]
Philipp Tschandl, Alan Cameron, Cliff Rosendahl, Harald Kittler

The 95% Confidence Intervals of the AUC of all 5 Algorithms overlap. Therefore all algorithms, including the new short pattern analysis, are considered equal in diagnostic accuracy.

Affiliations

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(b) Department of Dermatology and Venereology, Medical University of Vienna, Austria
(c) Centre de Dermatologie, Nemours, France

Any method can miss malignancies. We recommend that this poster should be studied in conjunction with reference [2].
Electronic format (PDF) requests for this poster: cliffrosendahl@bigpond.com

References

(1) Kittler H. Dermatoscopy: Introduction of a new algorithmic method based on pattern analysis for diagnosis of pigmented skin lesions. Dermatopathology: Practical & Conceptual. 2007 13, 1.
(2) Rosendahl C, Cameron A, Tschandl P. Dermatoscopy 2011. Facultas.wuv. Austria.
(3) Kittler H, Riedl E, Rosendahl C, Cameron A. Dermatoscopy of unpigmented lesions of the skin: a new classification of vessel morphology based on pattern analysis. Dermatopathology: Practical & Conceptual. 2008 14,4.
(4) Cameron A, Rosendahl C, Tschandl P, Riedl E, Kittler H. Dermatoscopy of pigmented Bowen's disease. J Am Acad Dermatol 2010; April; 62(4): 597-604.
(5) Rosendahl C, Tschandl P, Cameron A, Kittler H. Diagnostic accuracy of dermatoscopy for melanocytic and nonmelanocytic pigmented lesions. J. Am. Acad. Dermatol. 2011 Jun;64(6):1068-73.
(6) Tschandl P, Cameron A, Rosendahl C, Kittler H. Presented at the 2nd International Congress of the International Dermoscopy Society, Barcelona, Spain, November 2009.

1-7-2013

[1,2]

ALL **non-pigmented** lesions

PREDICTION without PIGMENT

A Decision Algorithm for Non-Pigmented Skin Malignancy

Cliff Rosendahl[1], Alan Cameron[1], Agata Bulinska[1], Philipp Tschandl[2], Harald Kittler[2]

1. School of Medicine, The University of Queensland, Australia
2. Department of Dermatology and Venereology, Medical University of Vienna, Austria

The method presented here is a diagnostic tool, but no method, including this one, can be guaranteed to detect every malignancy In particular, any Elevated, Firm, Growing (EFG) lesion should be excised[1]

Clues to Diagnosis

Although non-pigmented skin lesions lack clues of melanin structures, there are other useful non-vessel clinical and dermatoscopic clues that take priority.

Ulceration without a history of trauma should be regarded as a clue to malignancy. It is commonly present in BCC and even when not evident clinically it may often be identified by the presence of adherent fibre observed dermatoscopically.[2]

White clues* include dermatoscopic white lines as well as (in the case of raised lesions only) clues produced by keratin both on the surface of the skin (evident as scale) and beneath the stratum corneum where it appears in the form of dermatoscopic white circles and white structureless areas.[3] *For this purpose white clues do not include white dots or clods (so-called 'milia-like cysts') which can occur in malignant conditions but which are also common in seborrhoeic keratoses.*
Dermatoscopic white lines of any type, including perpendicular white lines (polarising-specific) are a clue to malignancy. Perpendicular white lines seen with polarised dermatoscopy are a published clue to BCC and melanoma as well as to the benign conditions Spitz naevus, DF, LPLK and scar tissue.[4] The authors have also seen them in IEC and PG.
White lines seen with non-polarising dermatoscopy can be a clue to both melanoma and BCC[5] but they also are not specific to malignancy.
In raised lesions, the keratin clues of dermatoscopic white circles, dermatoscopic white structureless areas and surface keratin are clues to SCC and KA.[3]
For the purpose of this algorithm a **raised lesion** is one with a significant visibly or palpably raised contour or with the dermatoscopic clue to a raised lesion of looped vessels.

Vessel type can be as dots, clods, linear, looped, curved, serpentine, helical or coiled and **vessel arrangement** can be random (non-specific), clustered, serpiginous, linear, centred, radial, reticular or branched.[2] A **monomorphous** vessel pattern consists of vessels of a single type sufficient to form a pattern. If there is more than a single vessel pattern or if more than one vessel type is present in significant quantities throughout the lesion in a speckled distribution the pattern is termed **polymorphous**.[5]

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If you cannot make a confident clinical diagnosis of solar or seborrhoeic keratosis, viral wart, dermal naevus or benign cyst then apply this algorithm:-

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Non-pigmented lesion

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- Ulceration or white clues* not present — **Apply vessel pattern analysis[2] (see below)**
  A polymorphous pattern including dots is strongly suspicious for melanoma
  A clods-only pattern, and in raised lesions a centred or serpiginous pattern, should be benign. All other patterns must be assessed for malignancy.

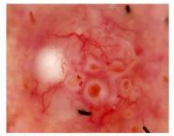
A **clods-only pattern** must have no vessels within the (red/purple) clods. A centred pattern must have vessels centred in **skin-coloured** clods.

Prediction without Pigment - full version

Non-pigmented lesion

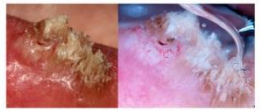
- Ulceration or white clues* present — **Consider Biopsy (exclude malignancy)**
  Ulceration: BCC, SCC, Melanoma
  White clues (lines): BCC, Melanoma, Spitz naevus, DF, LPLK, PG
  White clues (other): SCC/KA
- Ulceration or white clues* not present
  - Flat
    - Polymorphous vessels
      - Vessels as dots present — **Biopsy (exclude melanoma)**
      - Vessels as dots not present — BCC, IEC, SK, LPLK
    - Monomorphous vessels
      - Dots, serpentine or coiled — **Dots**: Melanocytic naevus, IEC, viral wart, inflammation/psoriasis
        Serpentine: BCC, scar
        Coiled: IEC, SK
      - Clods (red/purple) — **Clods: Haemangioma** (There must be no vessels within clods)
  - Raised
    - Vessel arrangement non-specific (random) (includes no vessels seen)
      - Not only clods — Melanoma, BCC, SCC/KA, SK, PG
      - Only clods(red/purple) — **Haemangioma, haemorrhage** (There must be no vessels within clods)
    - Vessel arrangement specific
      - Radial or branched — **Radial**: KA/SCC, BCC with ulceration, sebaceous gland hyperplasia, molluscum
        Branched: BCC, SCC/KA, Merkel cell carcinoma, any raised cyst or neoplasm
      - Serpiginous or centred — **Serpiginous: CCA**
        Centred: SK, viral wart, dermal naevus

(A centred pattern must be in **SKIN-COLOURED** clods)

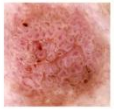


'White clues' (white circles in a raised lesion) are present so a decision to biopsy can be made without vessel pattern analysis. This is a dermatoscopic image of an SCC.

(Other specific vessel arrangements (clustered, linear and reticular) are not commonly encountered in a raised lesion and if present should be assessed as 'non-specific' for the purpose of this flowchart).



Clinical (left) and dermatoscopy (right) images of this lesion on an ear reveal that it is raised with 'white clues' of surface keratin and a white structureless area. It is an SCC.



Ulceration or 'white clues' are not present. Vessel pattern analysis reveals a centred vessel pattern (the vessels must be centred in **skin-coloured** clods) consistent with a benign diagnosis. This is a seborrhoeic keratosis.

There is no ulceration and no 'white clues'. The vessel pattern is **(red/purple)** clods-only consistent with the benign diagnosis of haemangioma. This pattern must not have any vessels within the clods to be interpreted as benign.

23-7-2013

[3,4]

Prediction without Pigment

[3,4]

Prediction without Pigment - short version

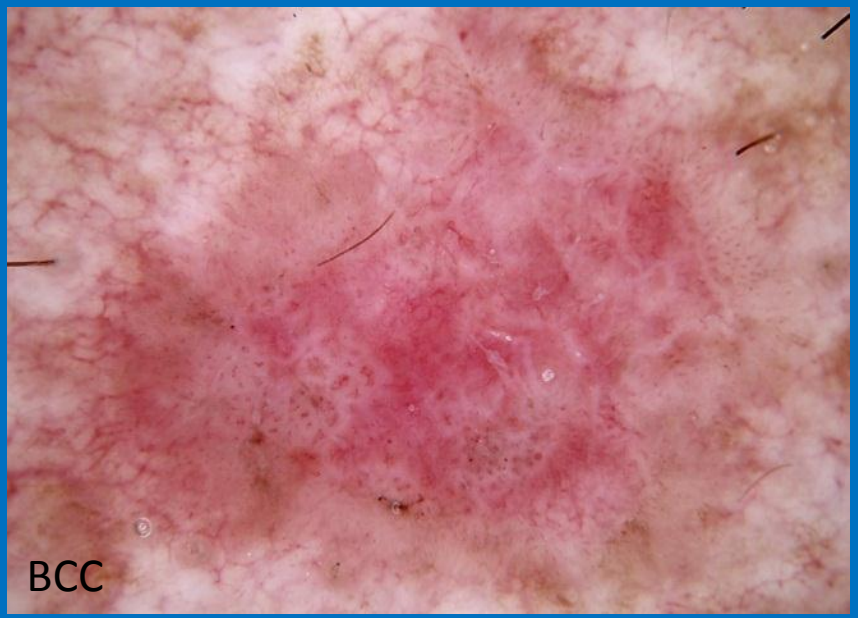
Non-pigmented lesion

- Ulceration or white clues* present — **Consider Biopsy (exclude malignancy)**
- Ulceration or white clues* not present — **Apply vessel pattern analysis[1] (see below)**
  A polymorphous pattern including dots is strongly suspicious for melanoma
  A clods-only pattern, and in raised lesions a centred or serpiginous pattern, should be benign.
  All other patterns should be assessed for the possibility of malignancy.

***White clues**

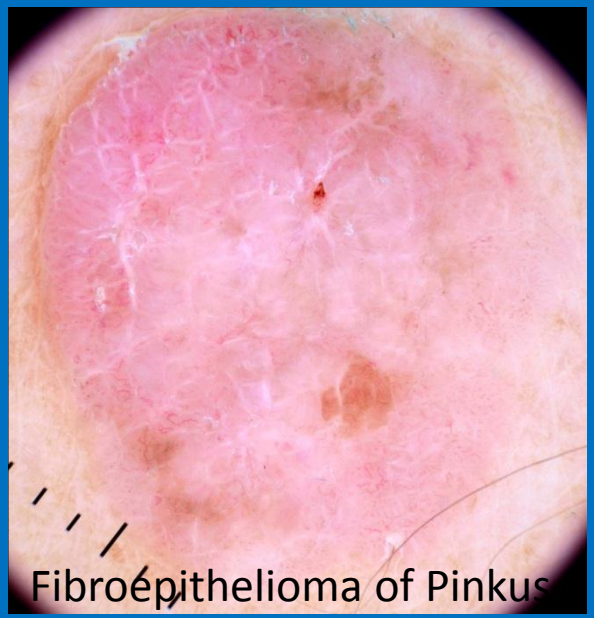
In any lesion: white lines

In a raised lesion: keratin scale, white circles or white structureless areas



BCC

White lines



Fibroepithelioma of Pinkus

Prediction without Pigment

Prediction without Pigment - short version

Non-pigmented lesion

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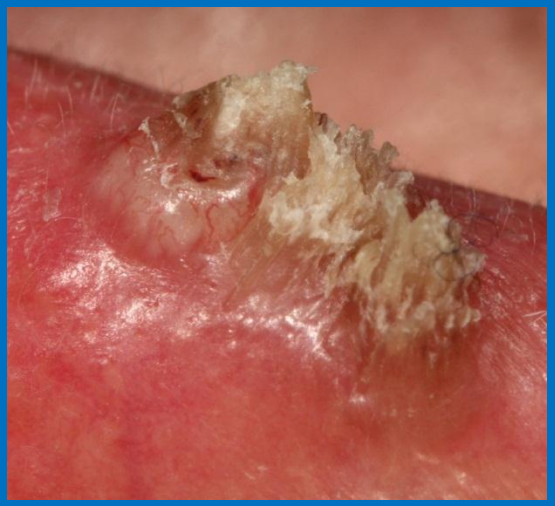
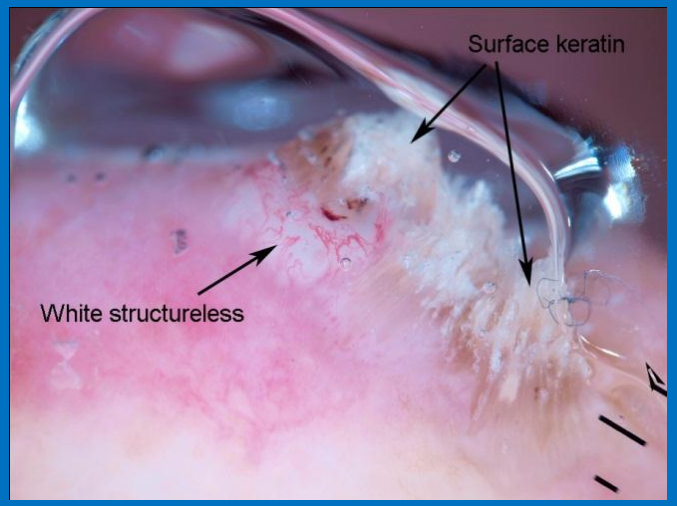
- Ulceration or white clues* not present — **Apply vessel pattern analysis[1] (see below)**
  A polymorphous pattern including dots is strongly suspicious for melanoma
  A clods-only pattern, and in raised lesions a centred or serpiginous pattern, should be benign.
  All other patterns should be assessed for the possibility of malignancy.

***White clues**
In any lesion: white lines
In a raised lesion: keratin scale, white circles or white structureless areas

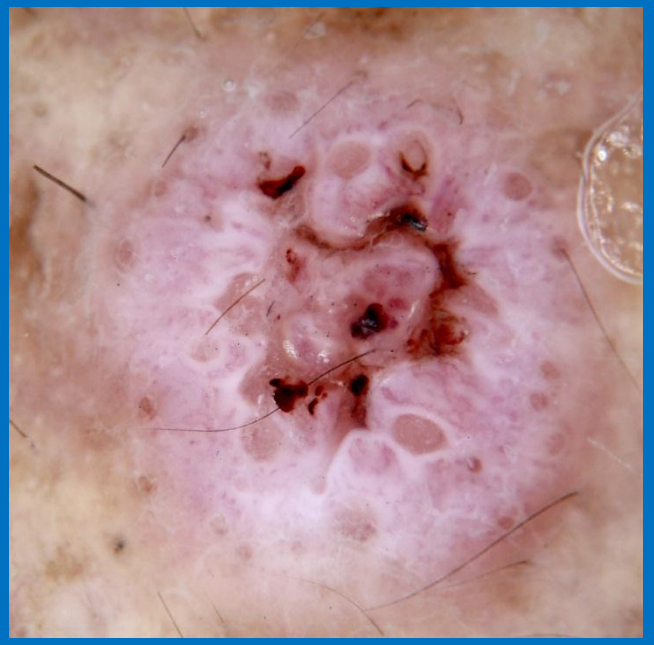
Keratin scale



White structureless area



White circles



Prediction without Pigment - short version

Non-pigmented lesion

- Ulceration or white clues* present — **Consider Biopsy (exclude malignancy)**
- Ulceration or white clues* not present — **Apply vessel pattern analysis[1] (see below)**
  A polymorphous pattern including dots is strongly suspicious for melanoma
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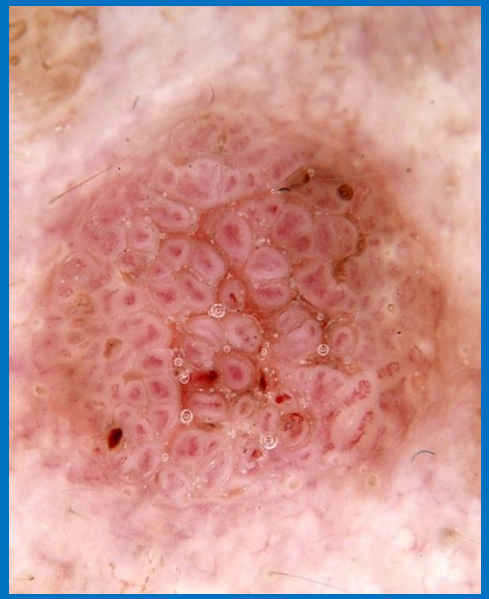
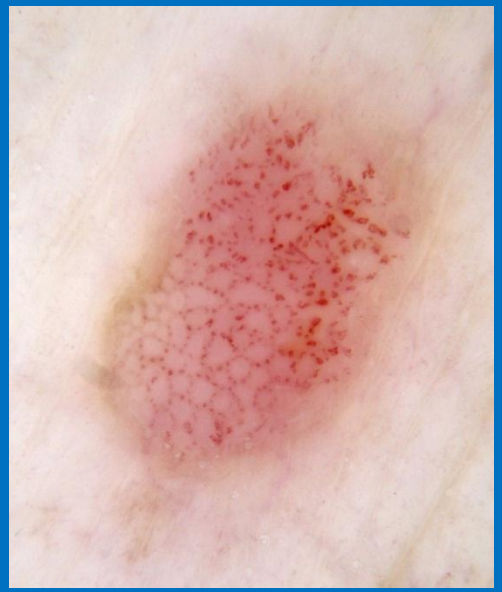
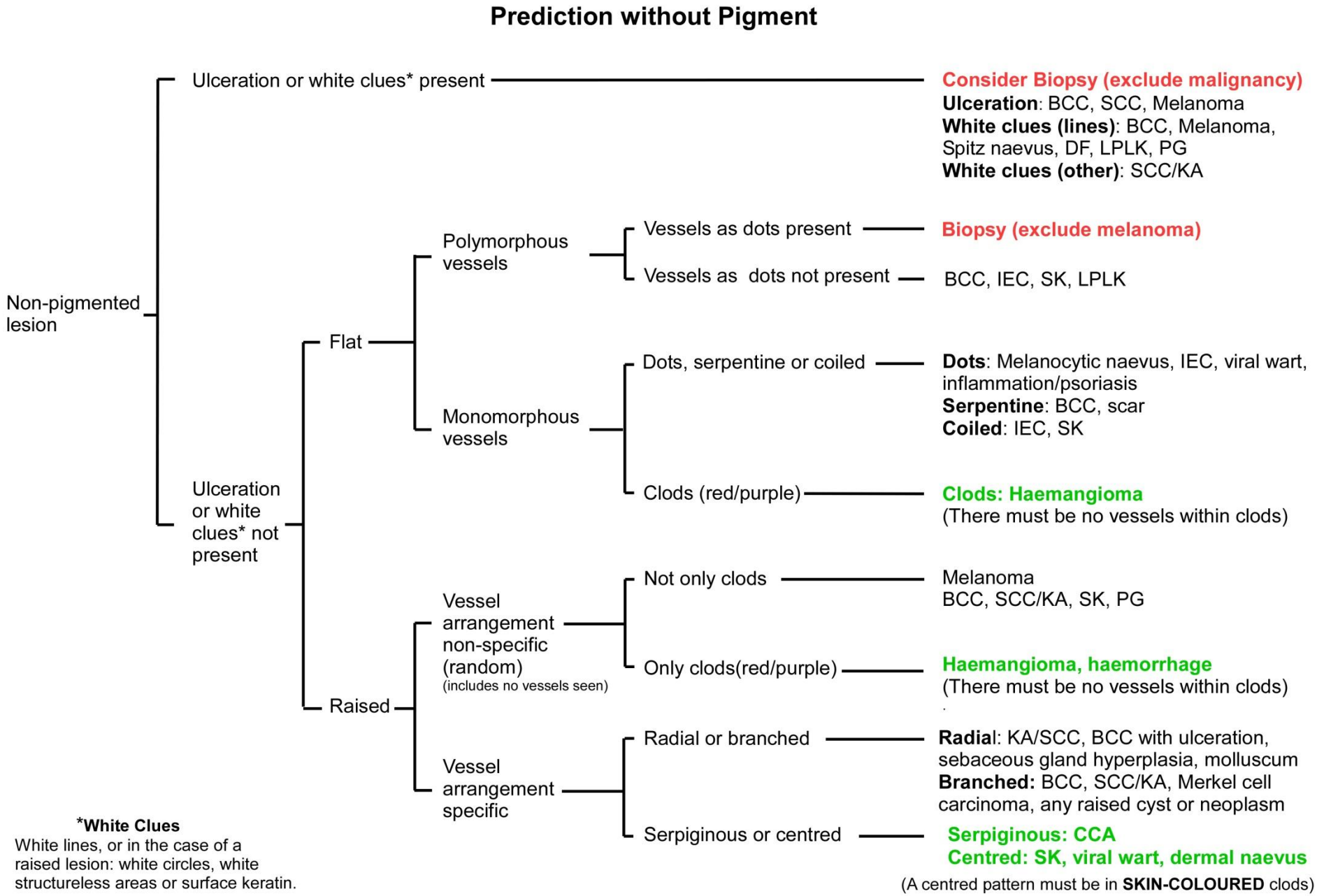
  All other patterns should be assessed for the possibility of malignancy.

***White clues**
In any lesion: white lines
In a raised lesion: keratin scale, white circles or white structureless areas

Malignant	Benign	Benign	Benign
			
Polymorphous with dots - melanoma	Clods only	Centred	Serpiginous

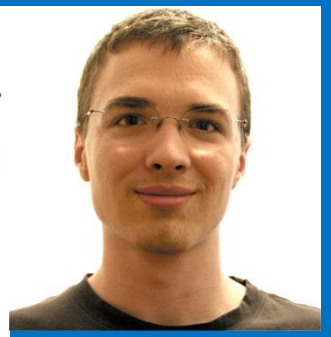
Prediction without Pigment – full version



ORIGINAL ARTICLE

Diagnostic accuracy of dermatoscopy for melanocytic and nonmelanocytic pigmented lesions

Cliff Rosendahl, MB BS,[a] Philipp Tschandl, Cand med,[b] Alan Cameron, MB BS,[a] and Harald Kittler, MD[b]
Brisbane, Australia, and Vienna, Austria



Background: It is unknown whether dermatoscopy improves the diagnostic accuracy for all types of pigmented skin lesions or only for those that are melanocytic.

Objective: We sought to assess if the addition of dermatoscopy to clinical examination with the unaided eye improves diagnostic accuracy for all types of pigmented lesions.

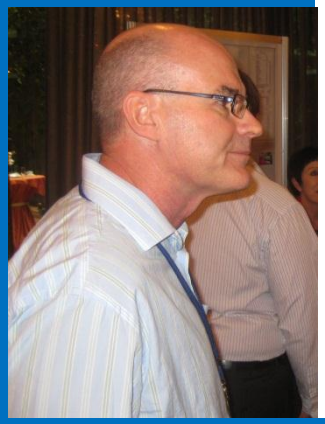
Methods: We analyzed 463 consecutively excised pigmented skin lesions collected during a period of 30 months in a primary care skin cancer practice in Queensland, Australia.

Results: Of 463 lesions, 217 (46.9%) were nonmelanocytic. Overall 30% (n = 138) were malignant including 29 melanomas, 72 basal cell carcinomas, and 37 squamous cell carcinomas. The diagnostic accuracy for malignant neoplasms measured as area under receiver operating characteristic curves was 0.89 with dermatoscopy and 0.83 without it ($P < .001$). Given a fixed specificity of 80%, the corresponding sensitivity was 82.6% with dermatoscopy and 70.5% without it. The improvement achieved by dermatoscopy was higher for nonmelanocytic lesions than for melanocytic lesions. A short algorithm based on pattern analysis reached a sensitivity of 98.6% for basal cell carcinoma, 86.5% for pigmented squamous cell carcinoma, and 79.3% for melanoma. Among benign conditions, the highest false-positive rate (90.5%) was observed for lichen planus–like keratosis.

Limitations: Estimates of diagnostic accuracy are influenced by verification bias.

Conclusions: Dermatoscopy improves the diagnostic accuracy for nonmelanocytic lesions. A simple algorithm based on pattern analysis is suitable for the detection of melanoma and nonmelanoma skin cancer. (J Am Acad Dermatol 10.1016/j.jaad.2010.03.039.)

Key words: basal cell carcinoma; dermatoscopy; melanocytic nevi; melanoma; nonmelanoma skin cancer; pigmented skin lesions; squamous cell carcinoma.



Chaos & Clues was evaluated in this study

CONCLUSIONS

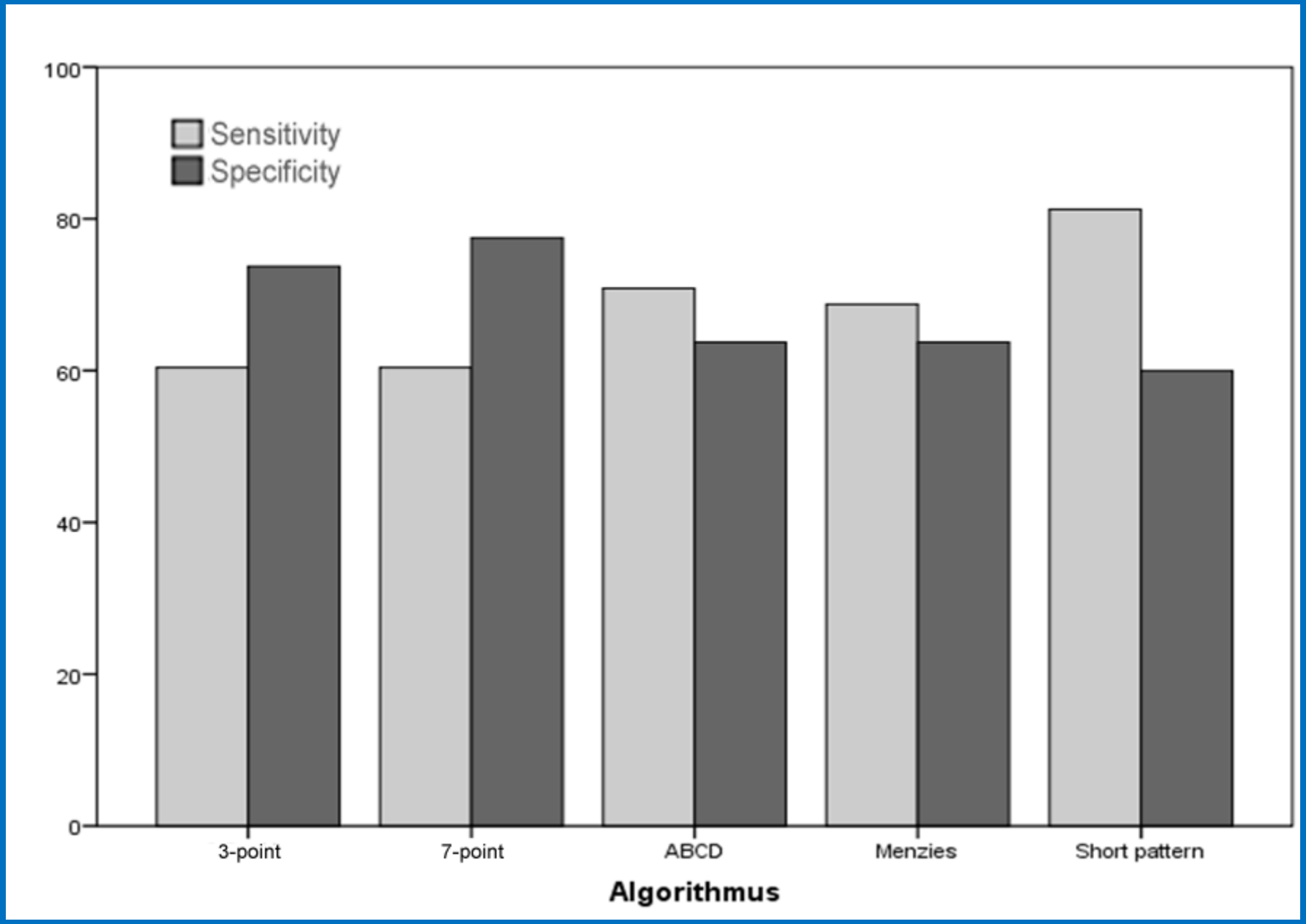
CHAOS & CLUES

Sensitivity - 90.6%

Specificity - 62.7%

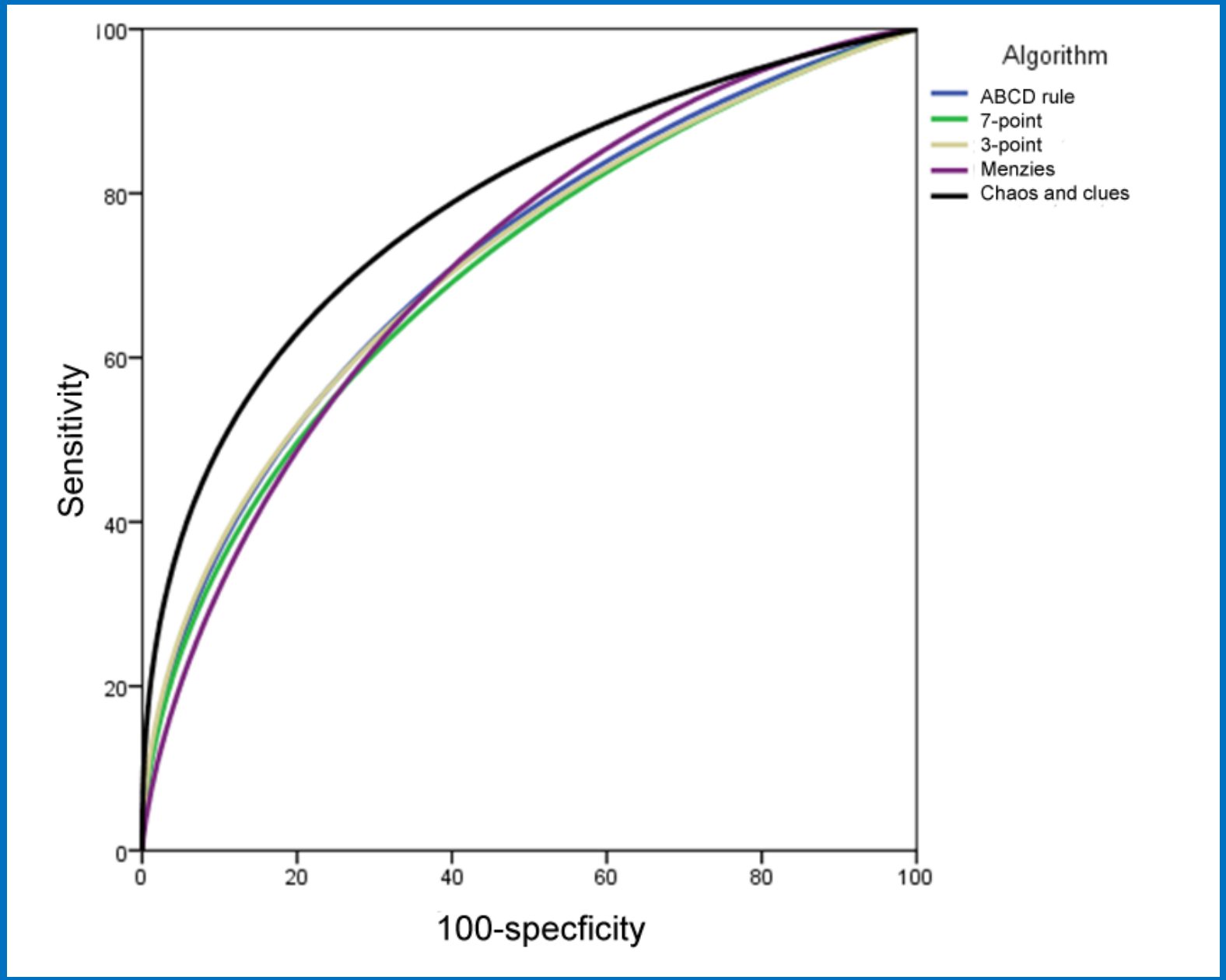
(77.4% if seb k diagnosed by pattern analysis)

[2,5]

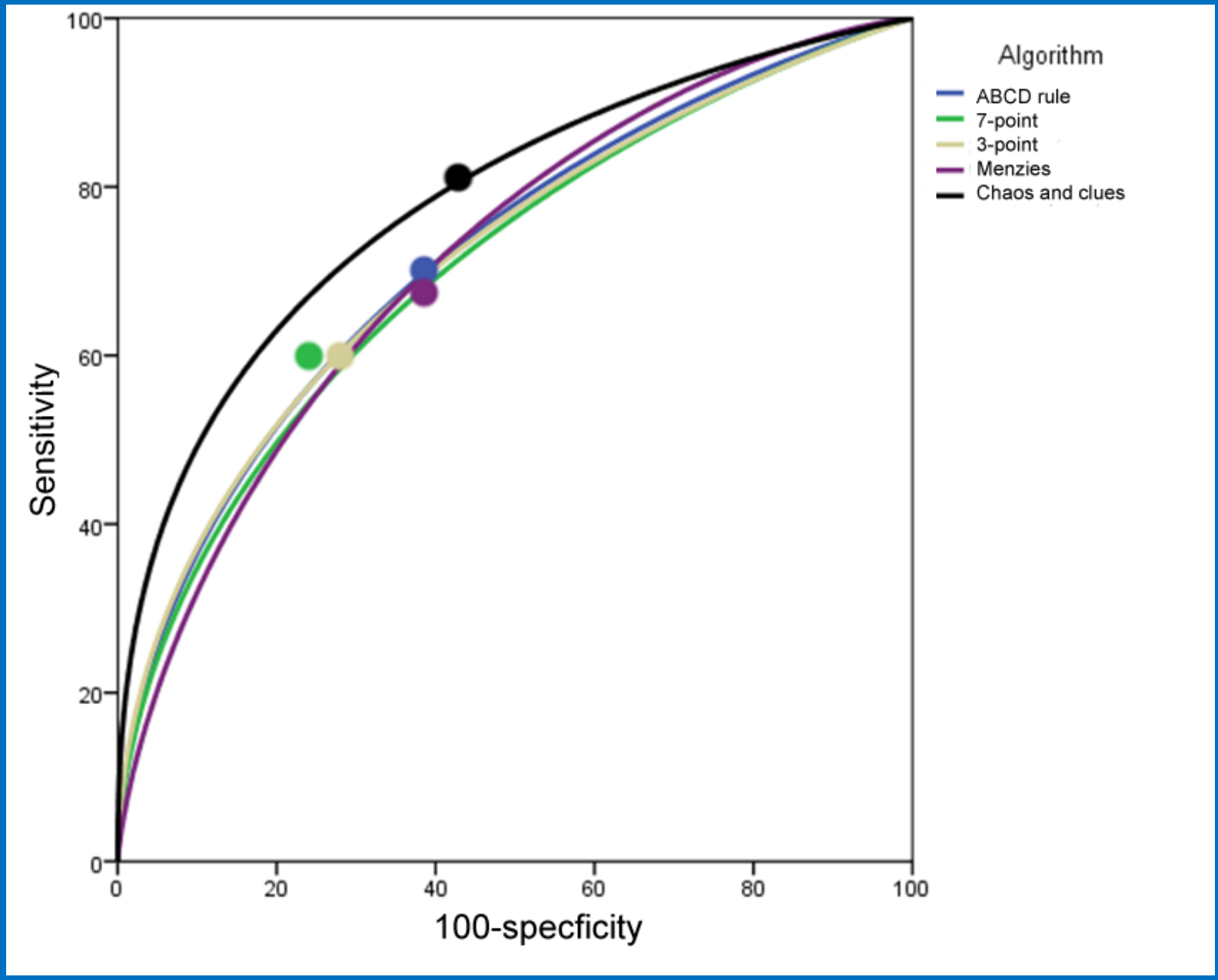


Short Pattern Analysis is Chaos and Clues

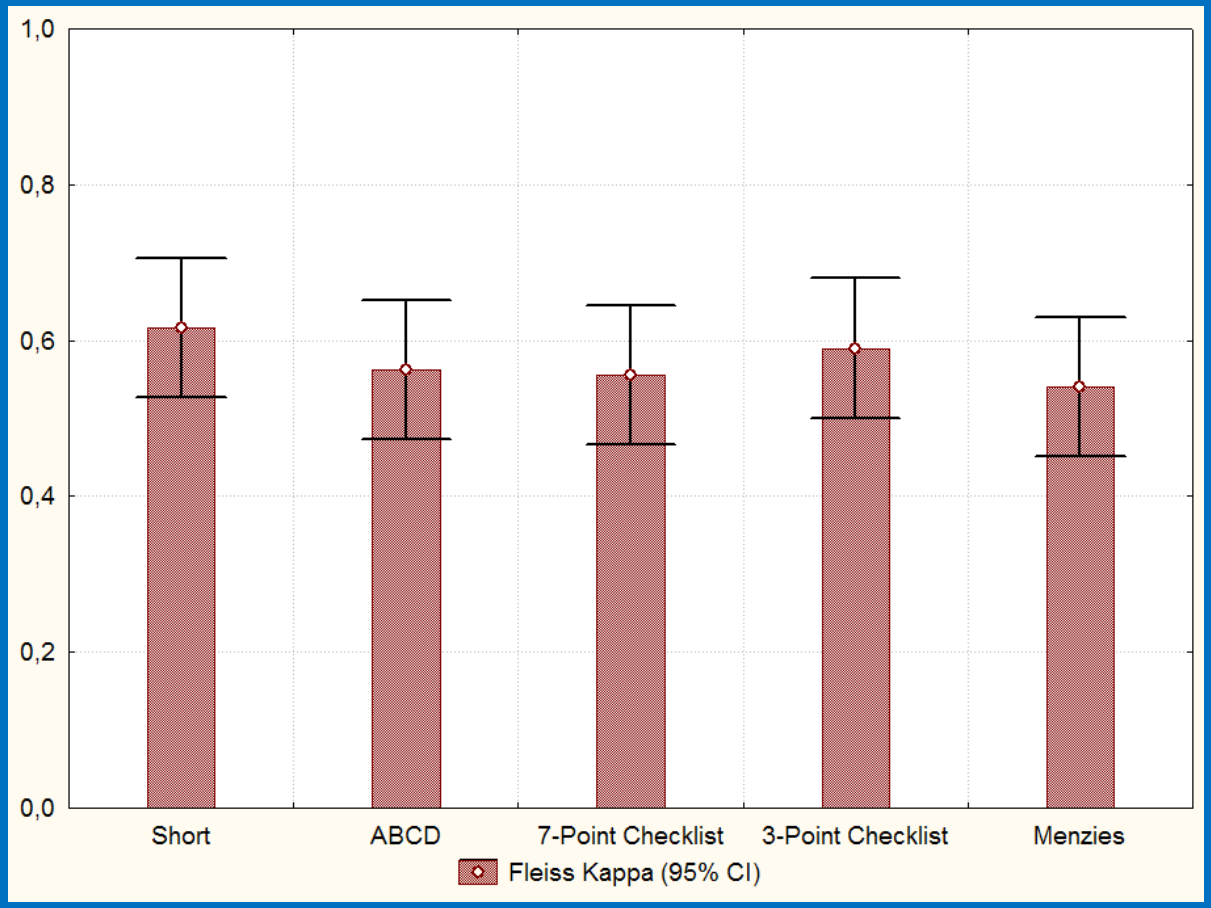
[5]


Algorithm
ABCD rule
7-point
3-point
Menzies
Chaos and clues
Sensitivity
100-specficity
0
20
40
60
80
100

[5]

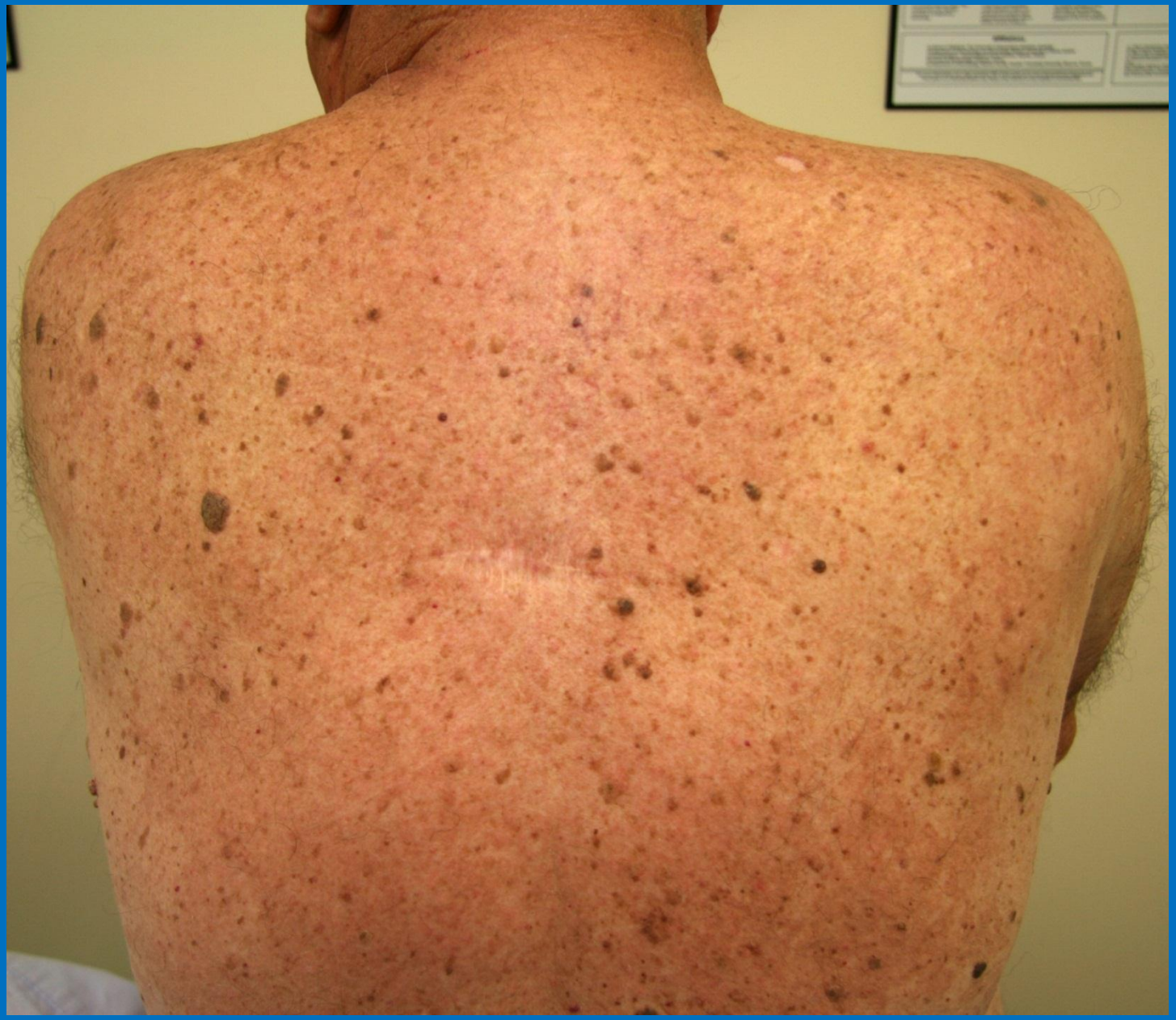

Algorithm
ABCD rule
7-point
3-point
Menzies
Chaos and clues
Sensitivity
100-specficity
0
20
40
60
80
100

Interobserver Agreement



Short Pattern Analysis is Chaos and Clues

[5]

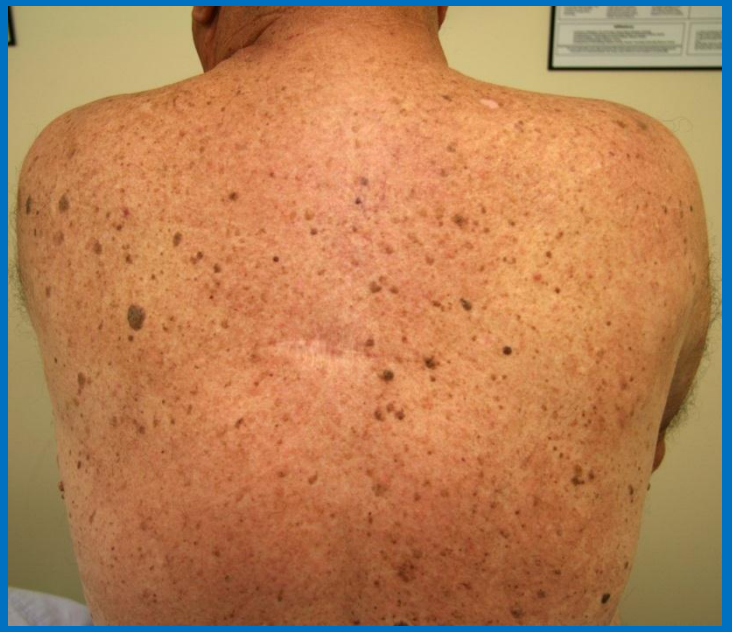


Apply Chaos and Clues here…

Method Chaos & Clues

90% sensitivity (% of malignant lesions detected)

70% specificity (% of benign lesions correctly diagnosed. If 70% are diagnosed correctly, 30% are excised)



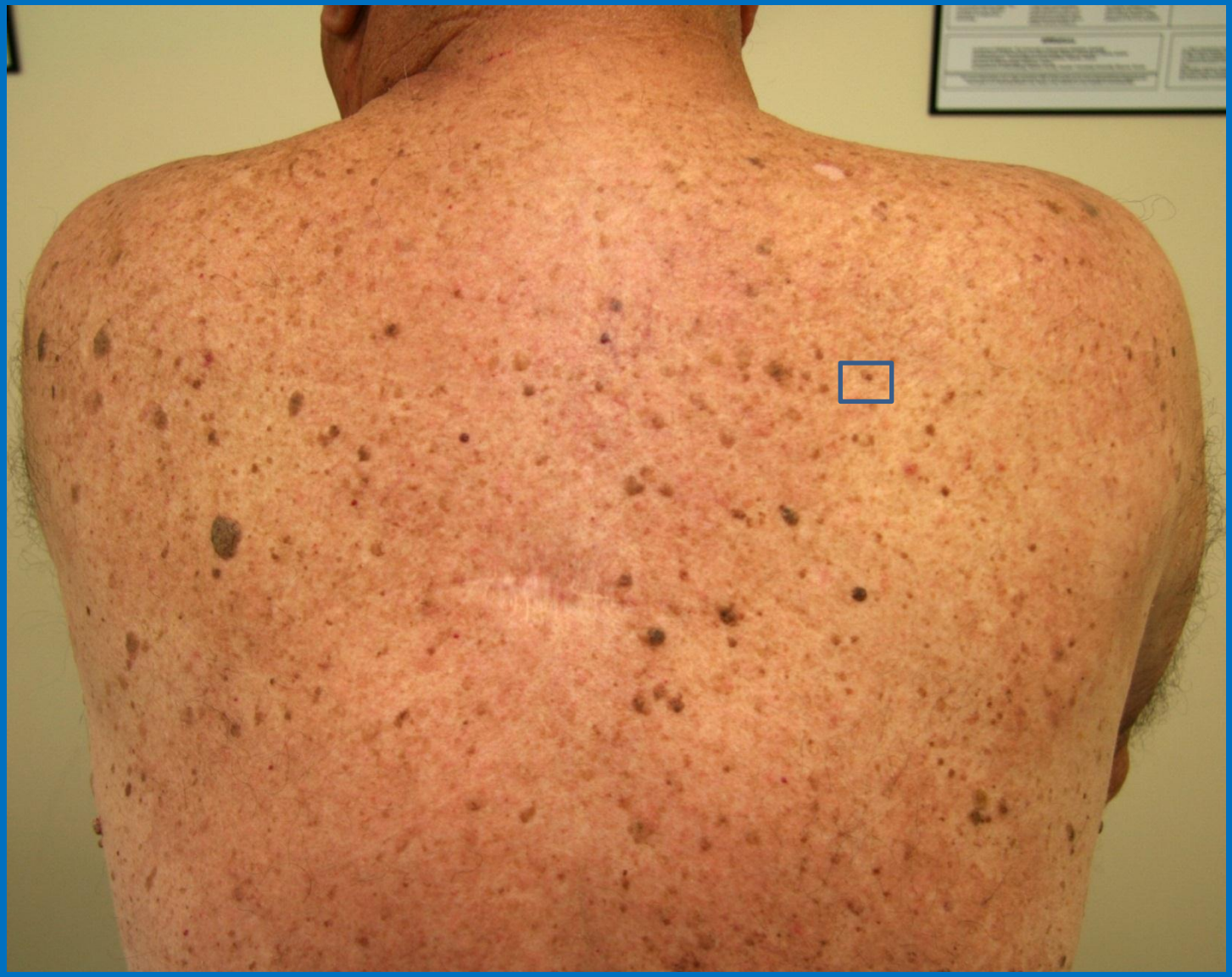
Sample size 500

1 melanoma detected (0.9 of 1)

150 benign lesions excised? (30% of 500)

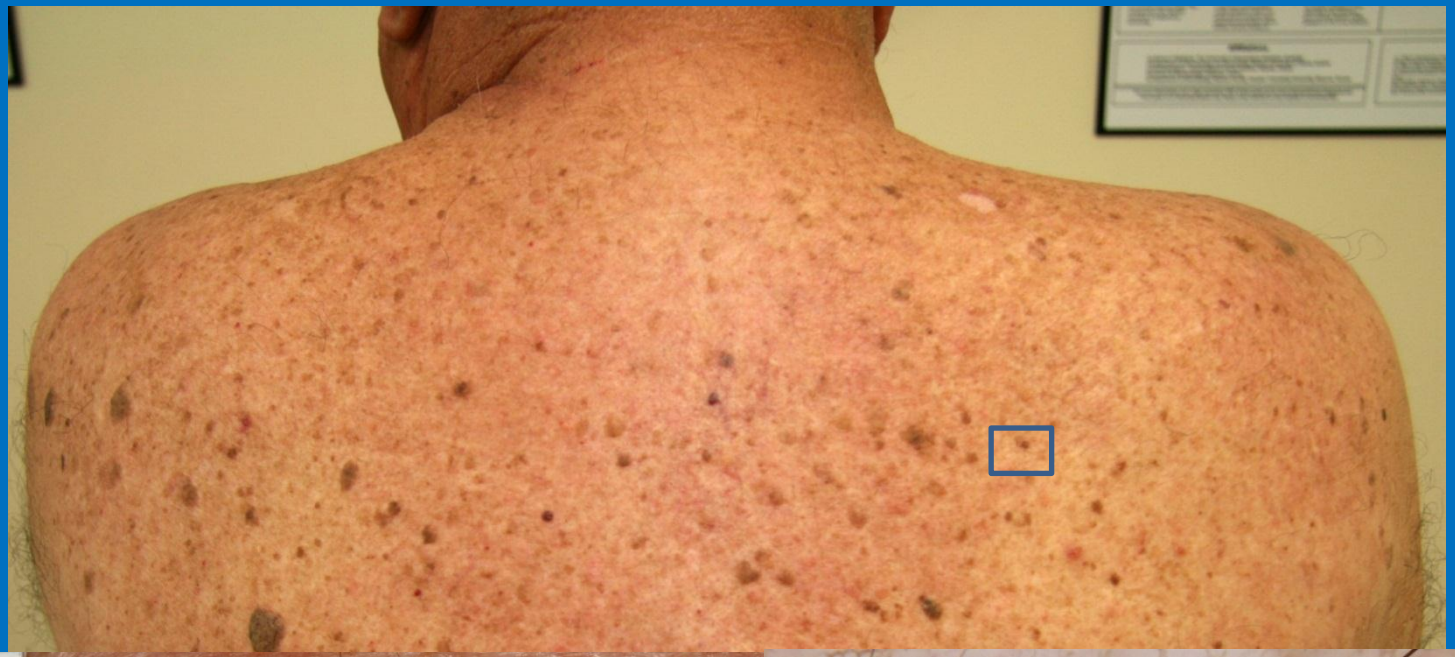
Why not? (only one was excised!)

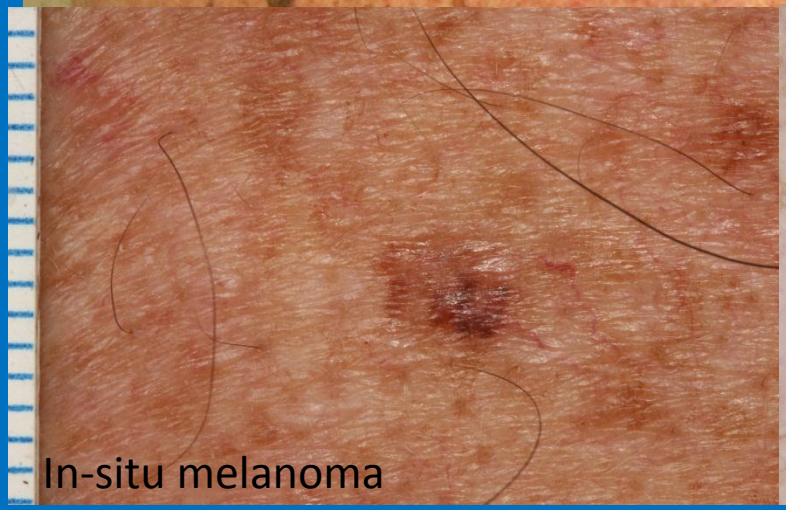
Selection bias!

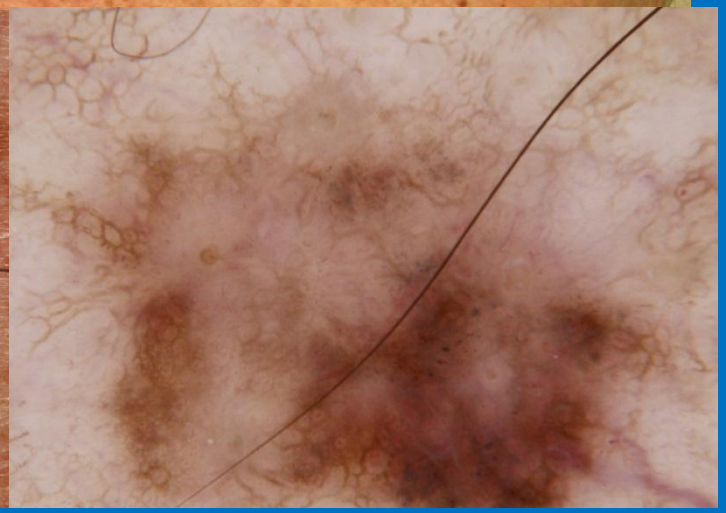


This is the only one that went into the study…

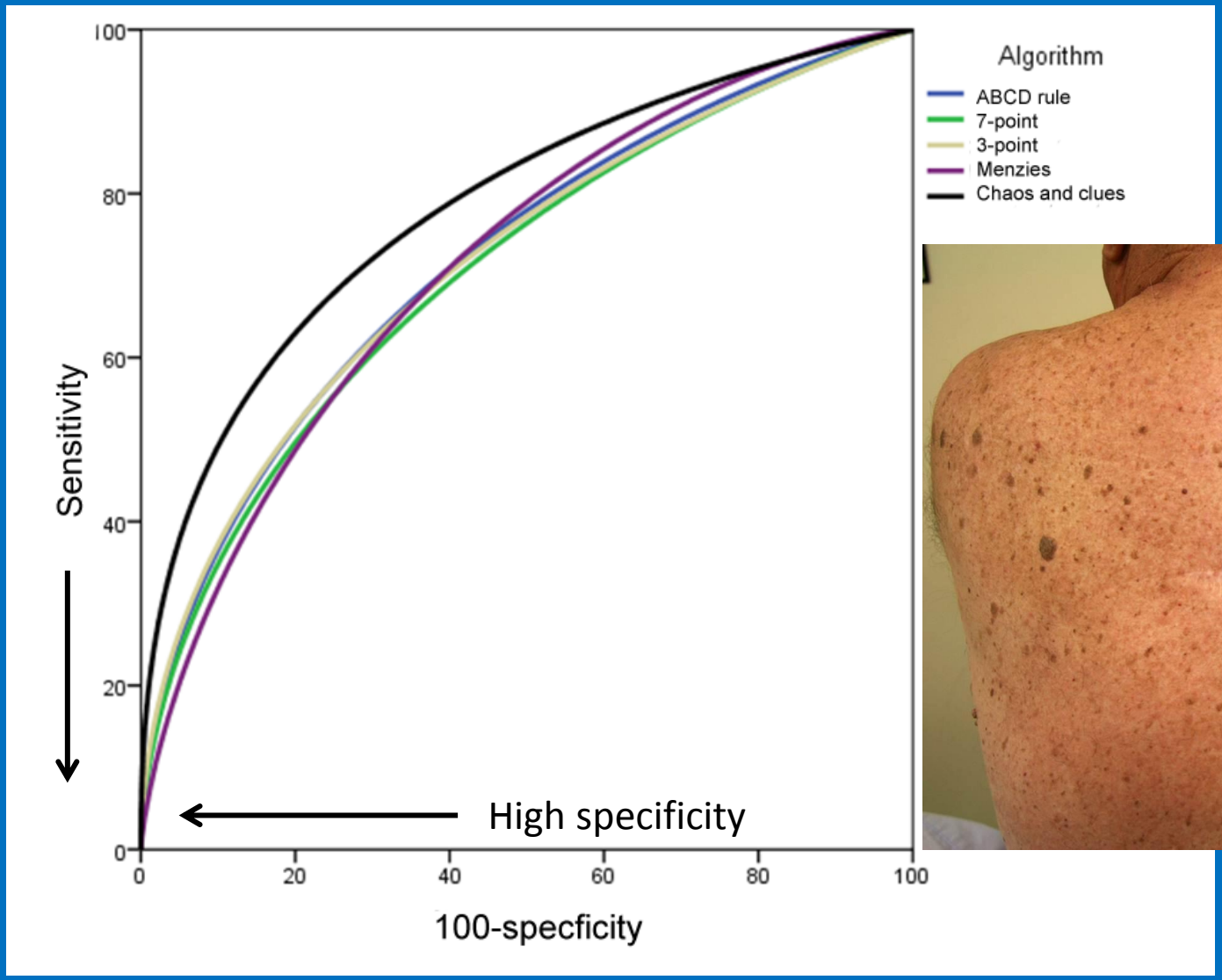
Selection bias!

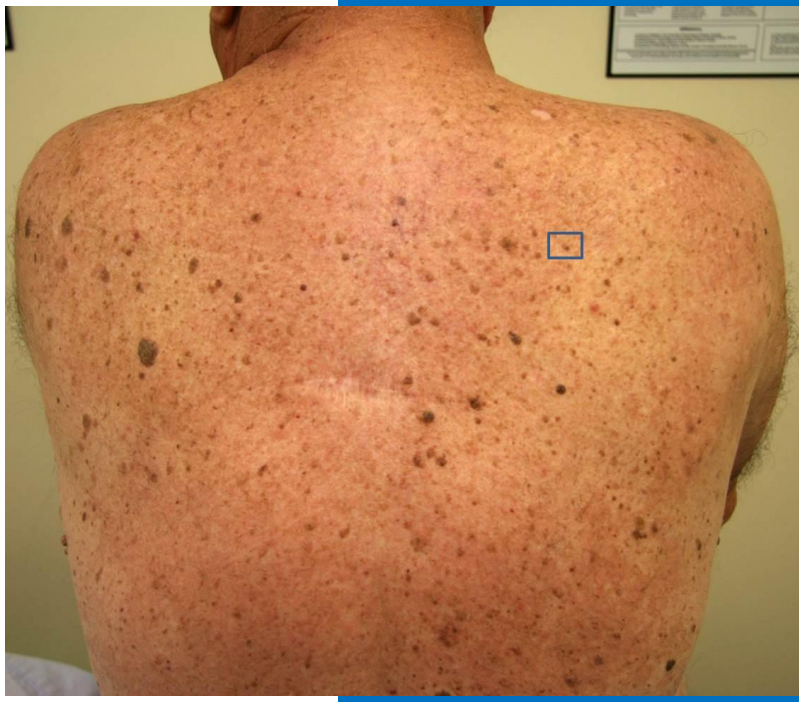






In real life SPECIFICITY is much higher – almost 100%



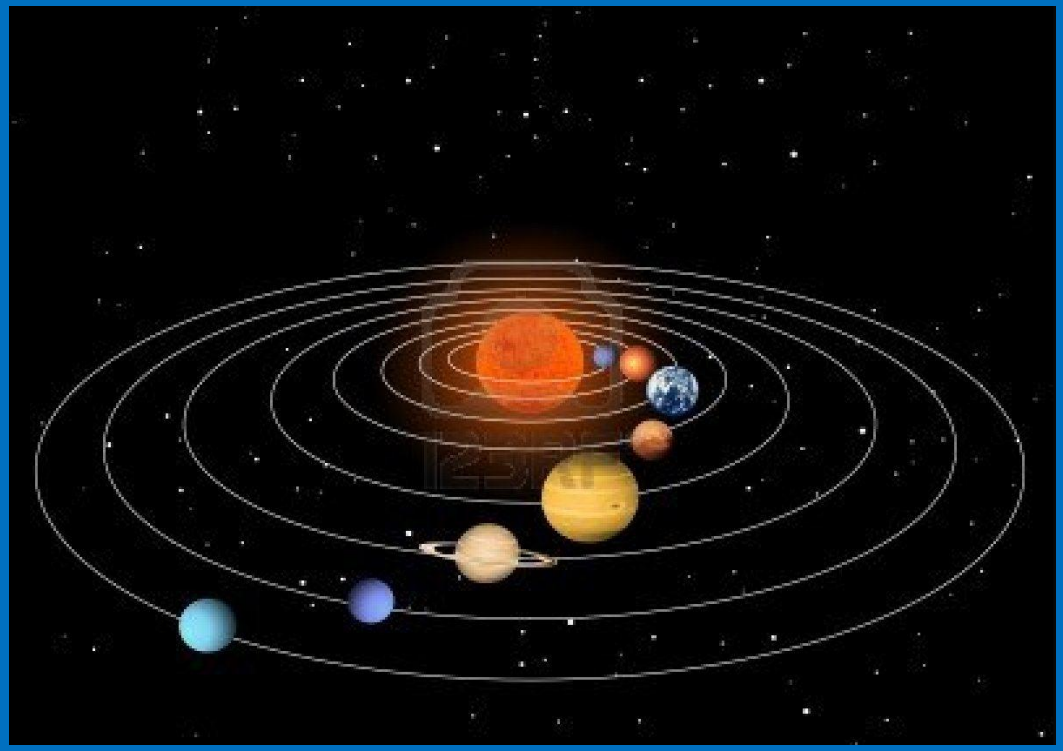


And sensitivity is lower…

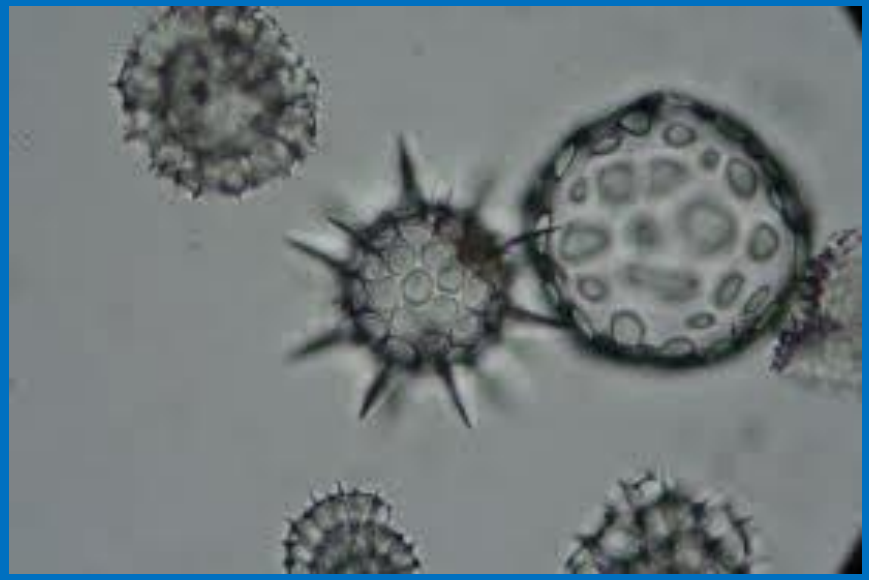
Sensitivity and Specificity are in constant tension against each other

[5]

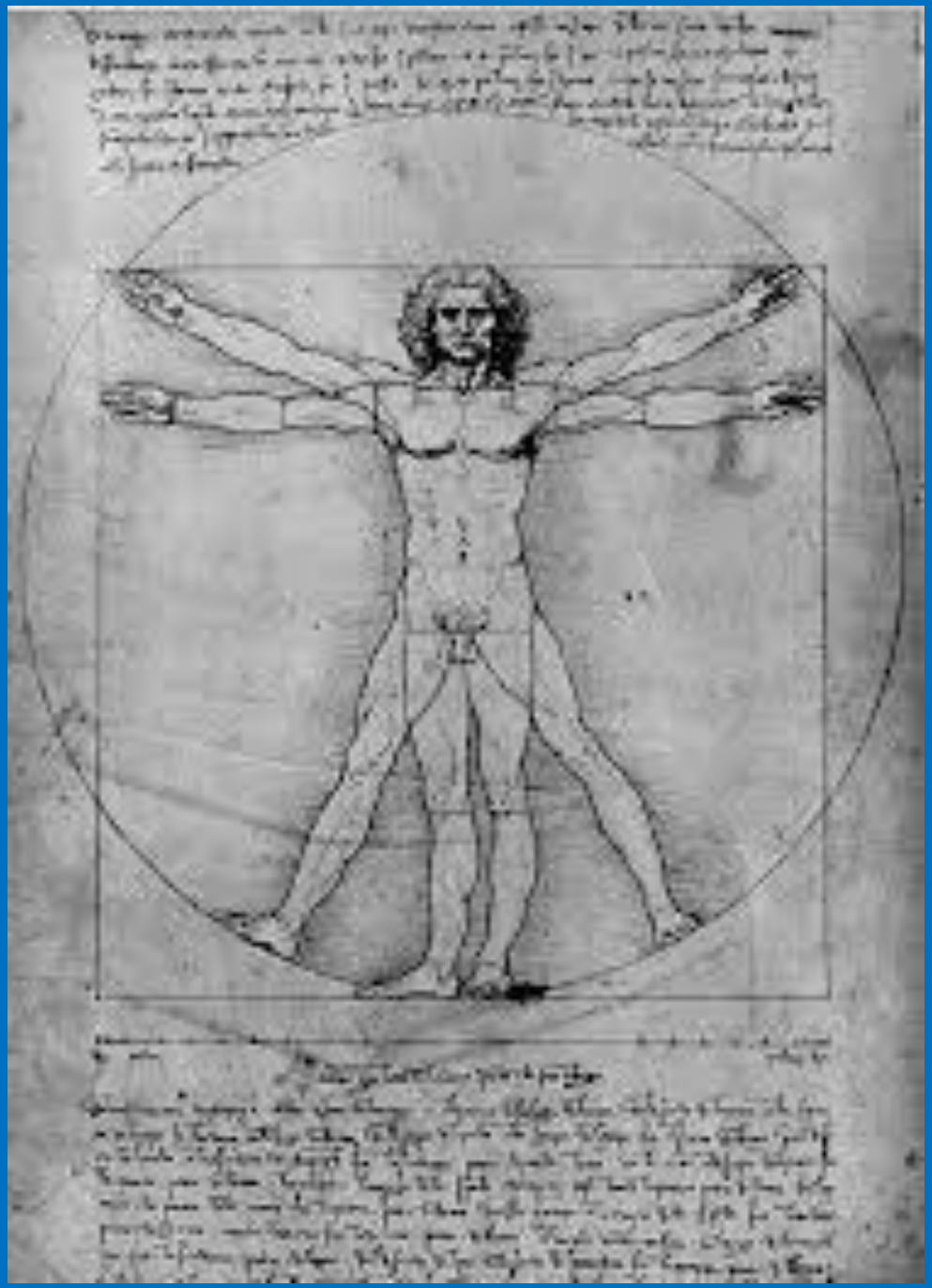
The chaos factor…



Natural laws favour symmetry



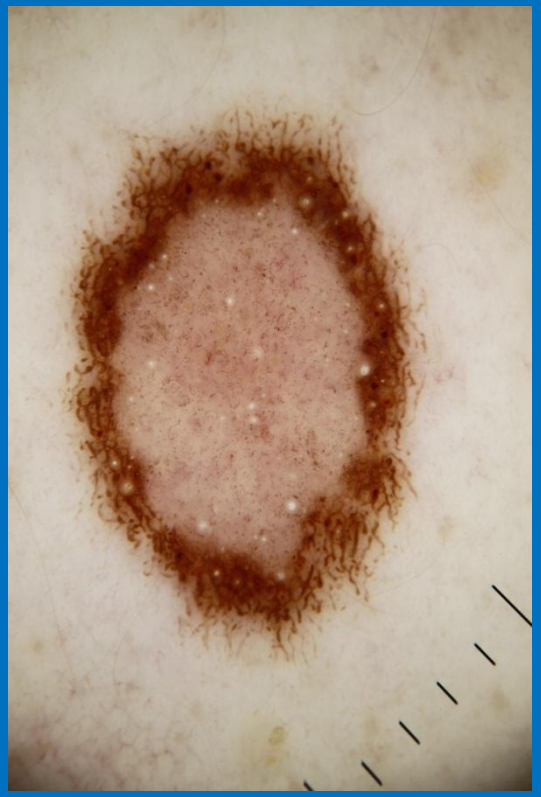

L'ILLUSTRATION HORTICOLE
ZAMIA TONKINENSIS LIND. et ROD.

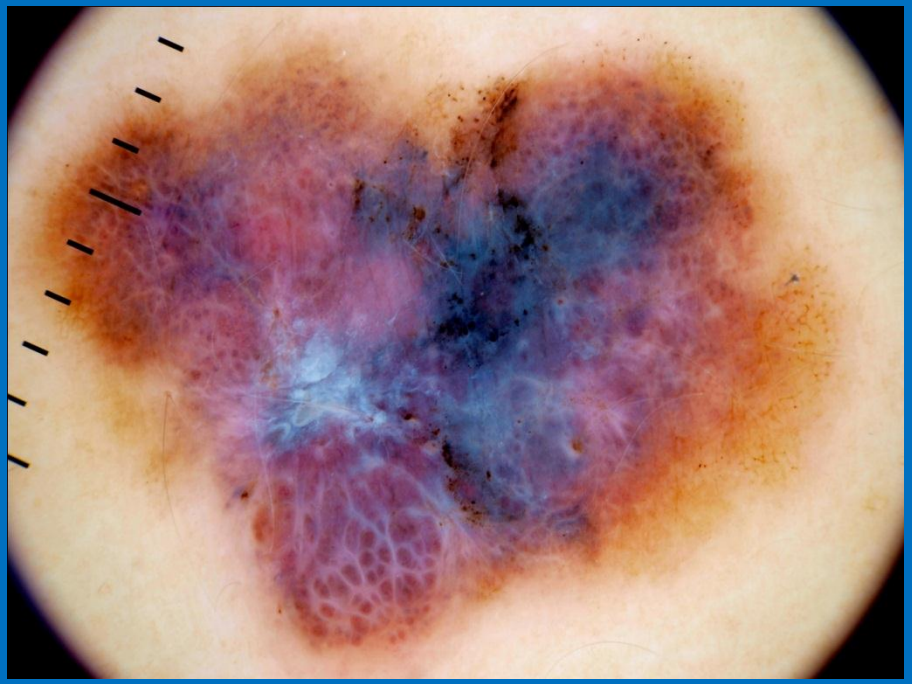


Natural laws favour symmetry

- Gravity
- Electrical and magnetic fields
- Conservation of energy
- Osmosis
- Chemical equilibrium
- Heat transfer
- Surface tension
- Natural selection favours mechanical efficiency
- Biologic Feed-back mechanisms that evolved

Malignant cells defy natural laws



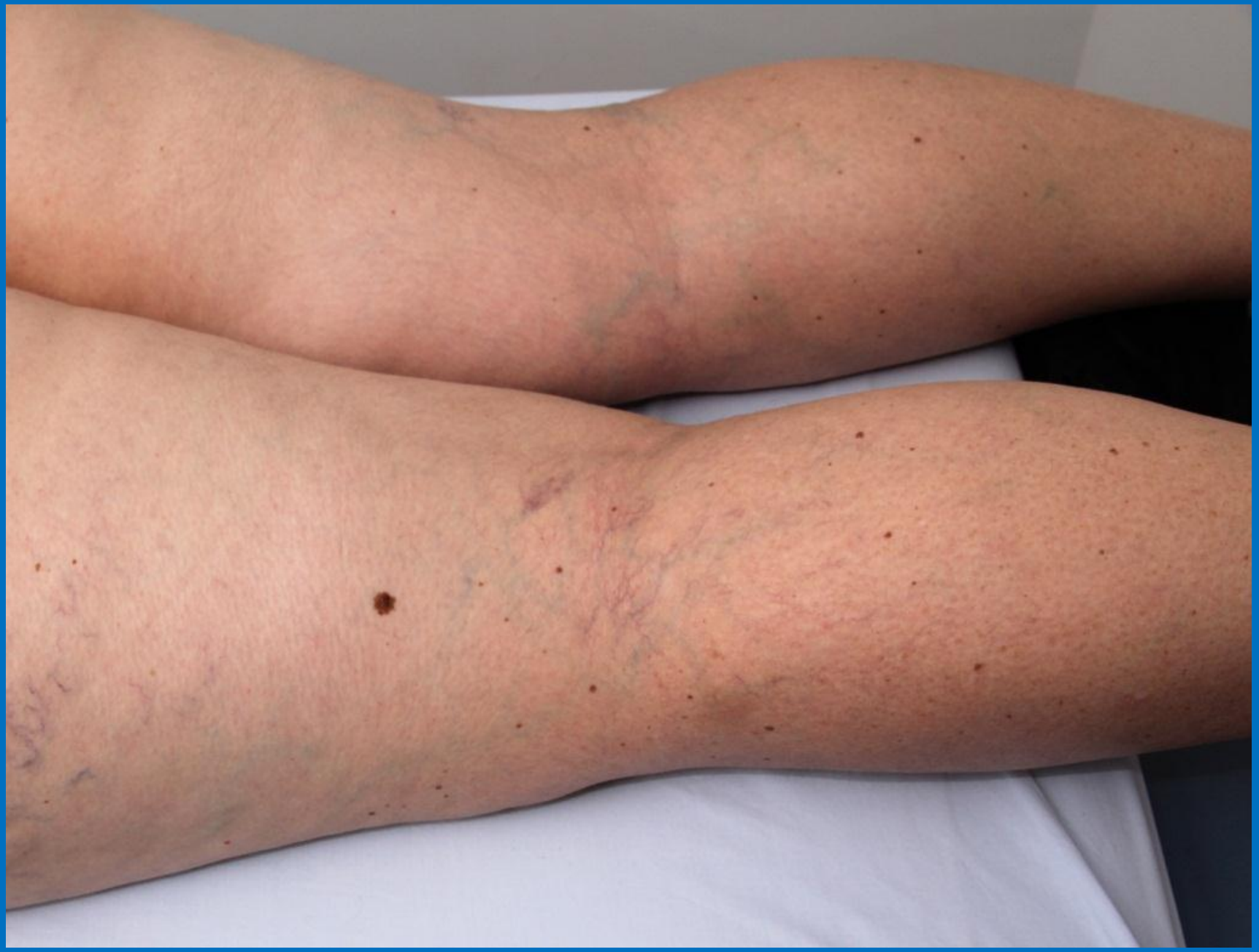


The most valuable clinical sign of all…

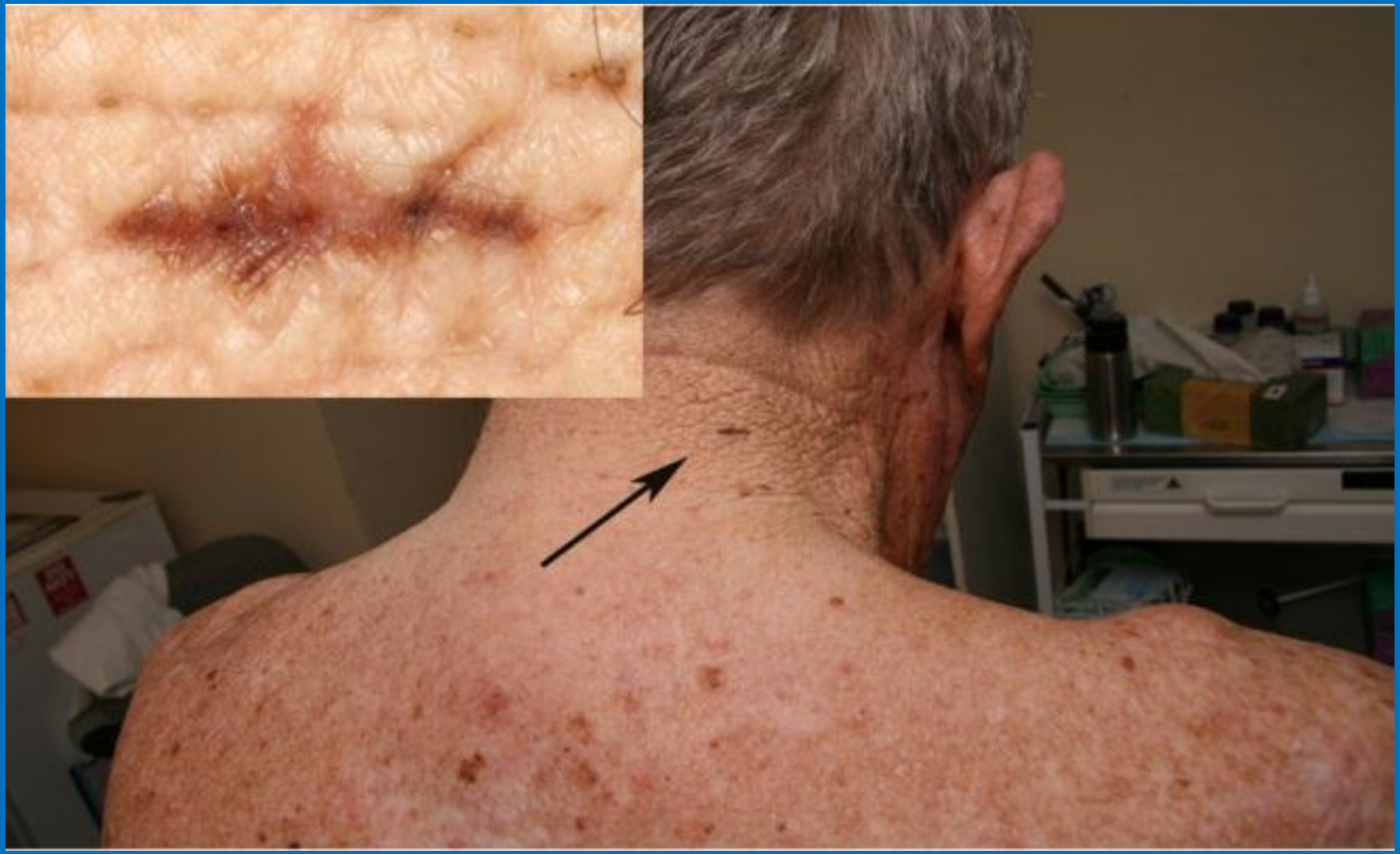
'Chicks dig me'
Courtesy Don McMahon
www.birdsonthings.com

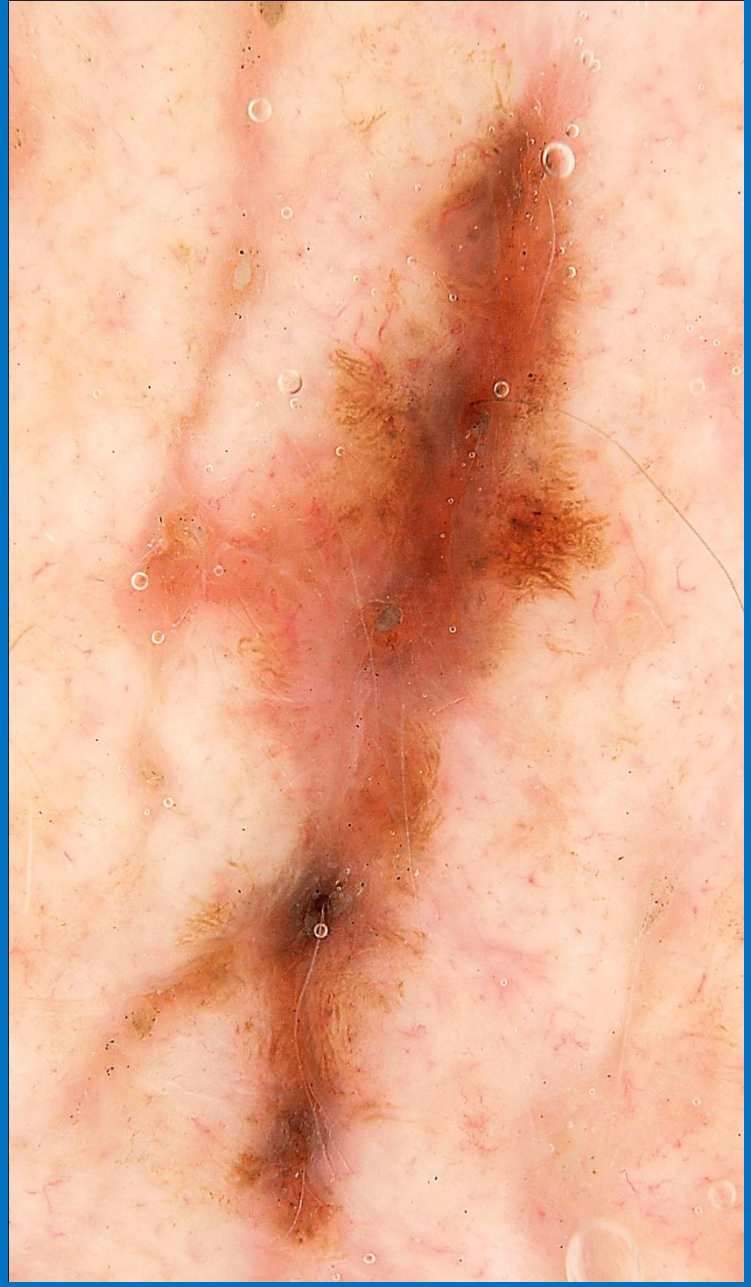
The break in the pattern…

The chaotic behaviour acts at the **clinical level** as well as the dermatologic and dermatopathologic level. Malignant lesions turn up where not expected and may **"break the pattern"** in the area they arise in by virtue of size, shape and colour.

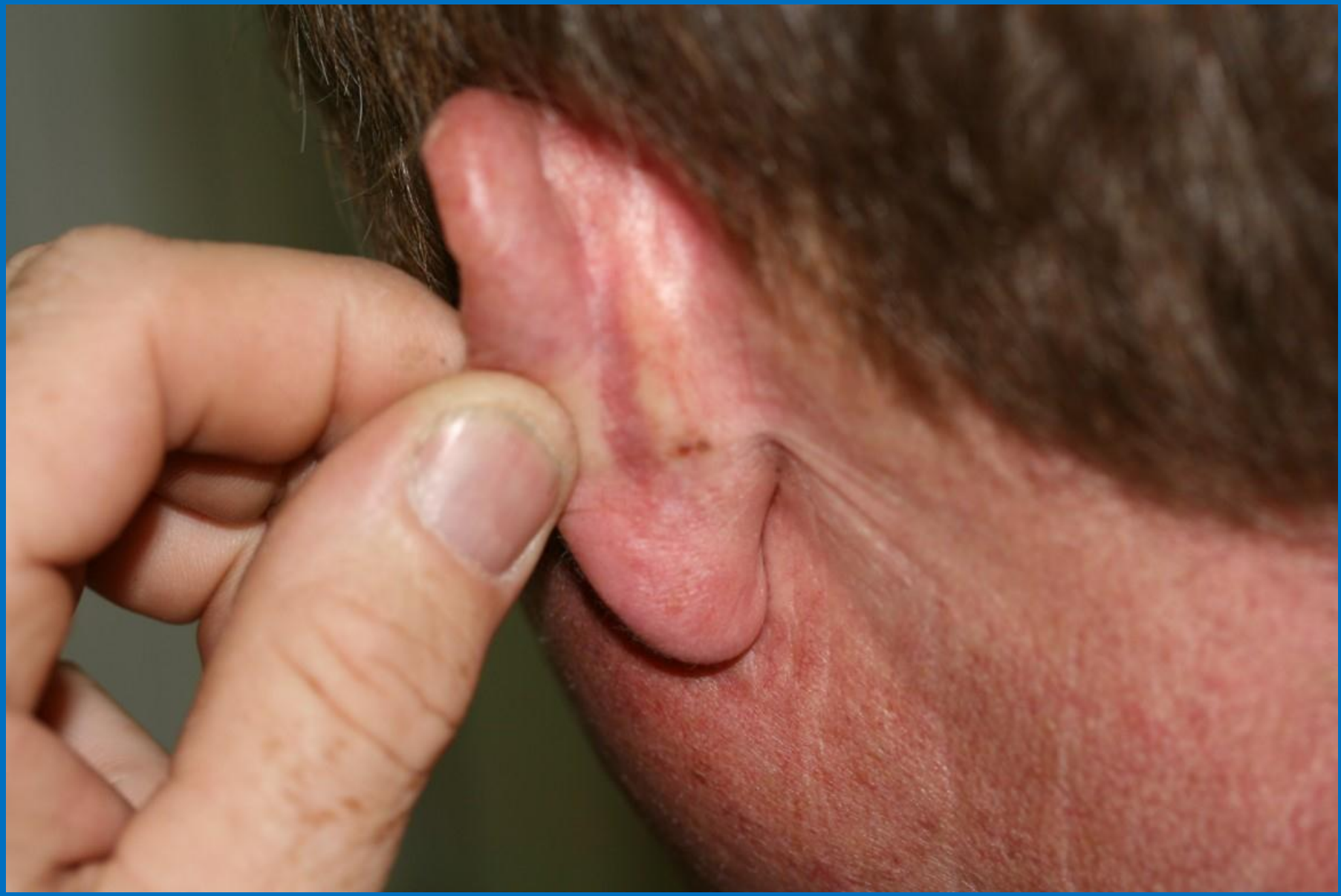


Invasive melanoma

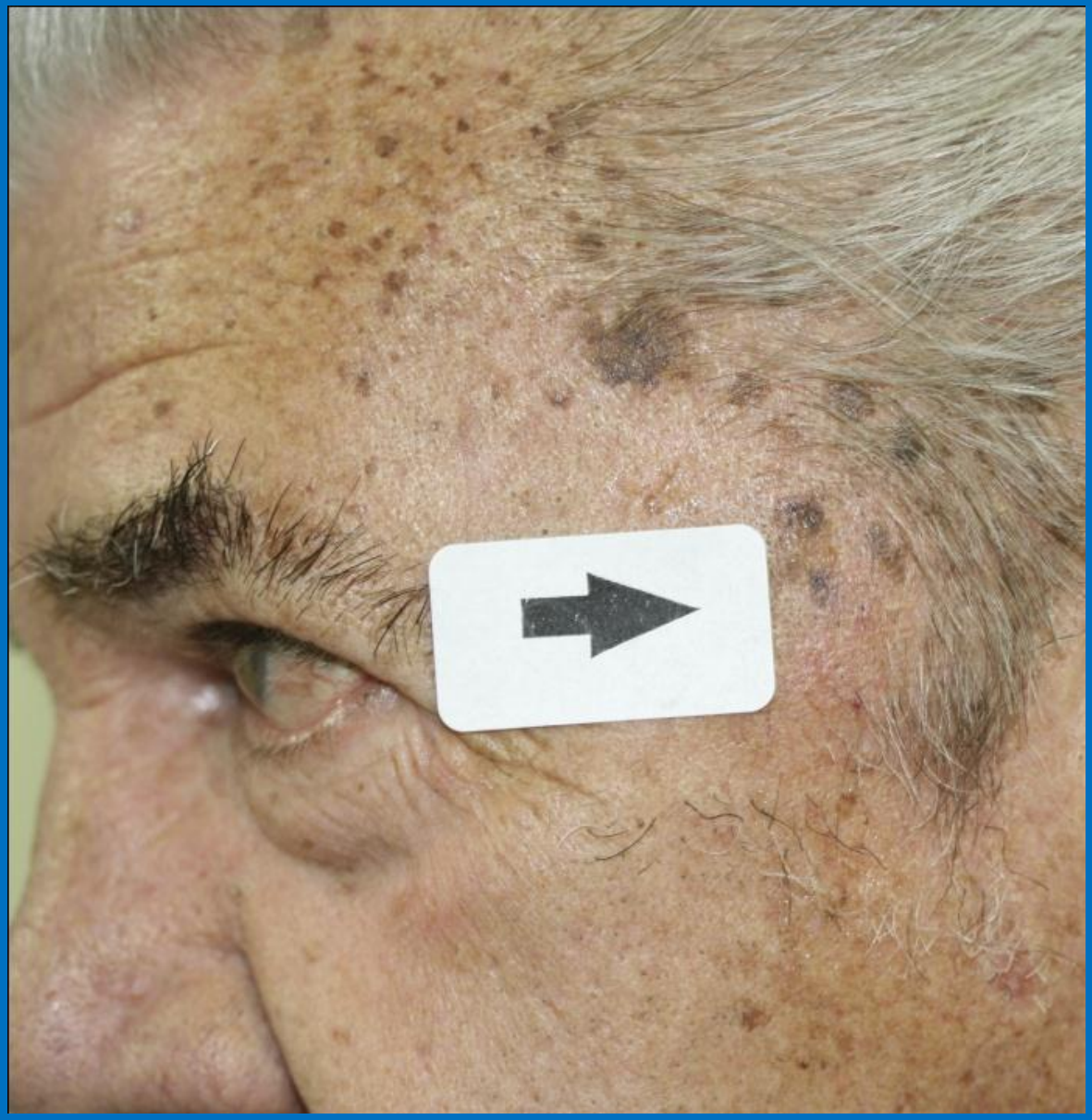




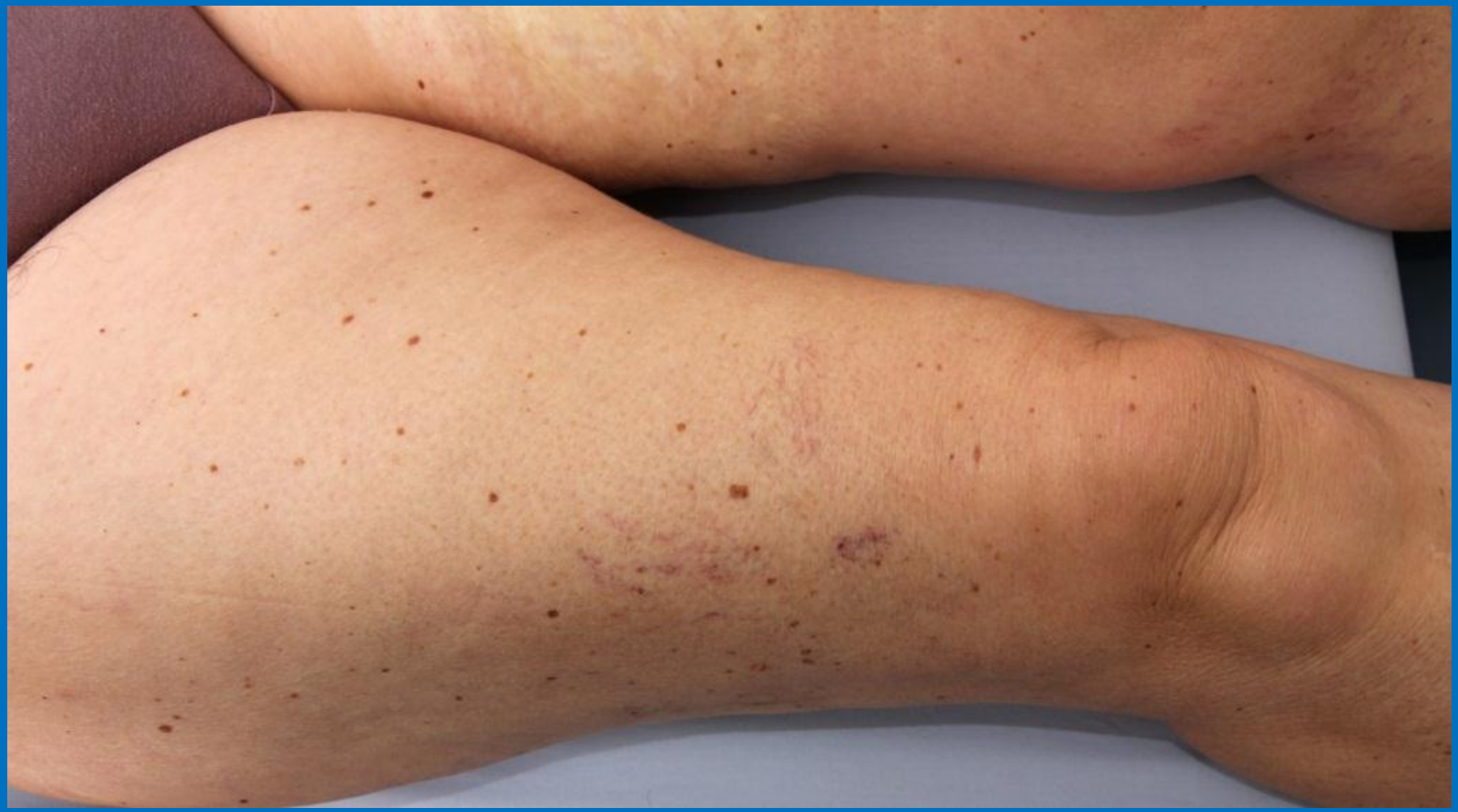
Be very suspicious when a lesion looks like an evolved or created complex object. That is not expected in a benign lesion.



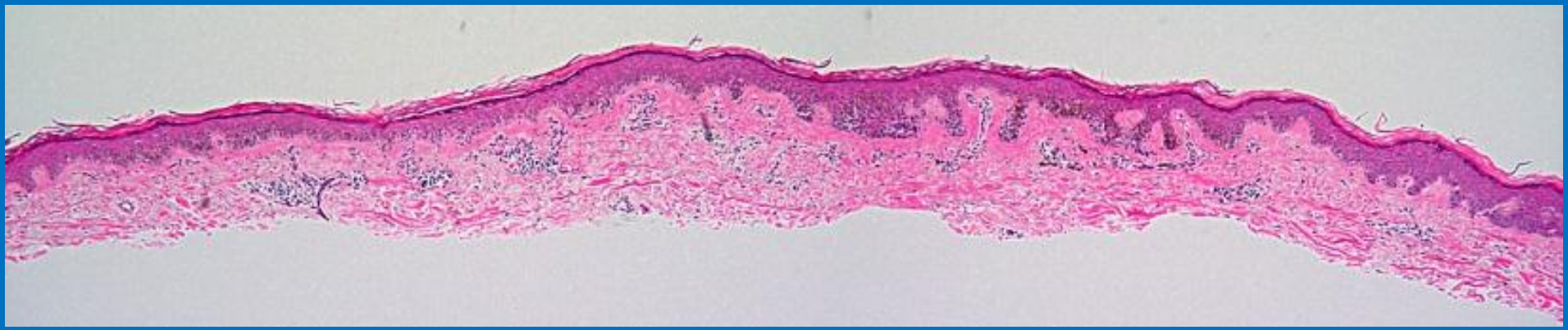
In-situ melanoma

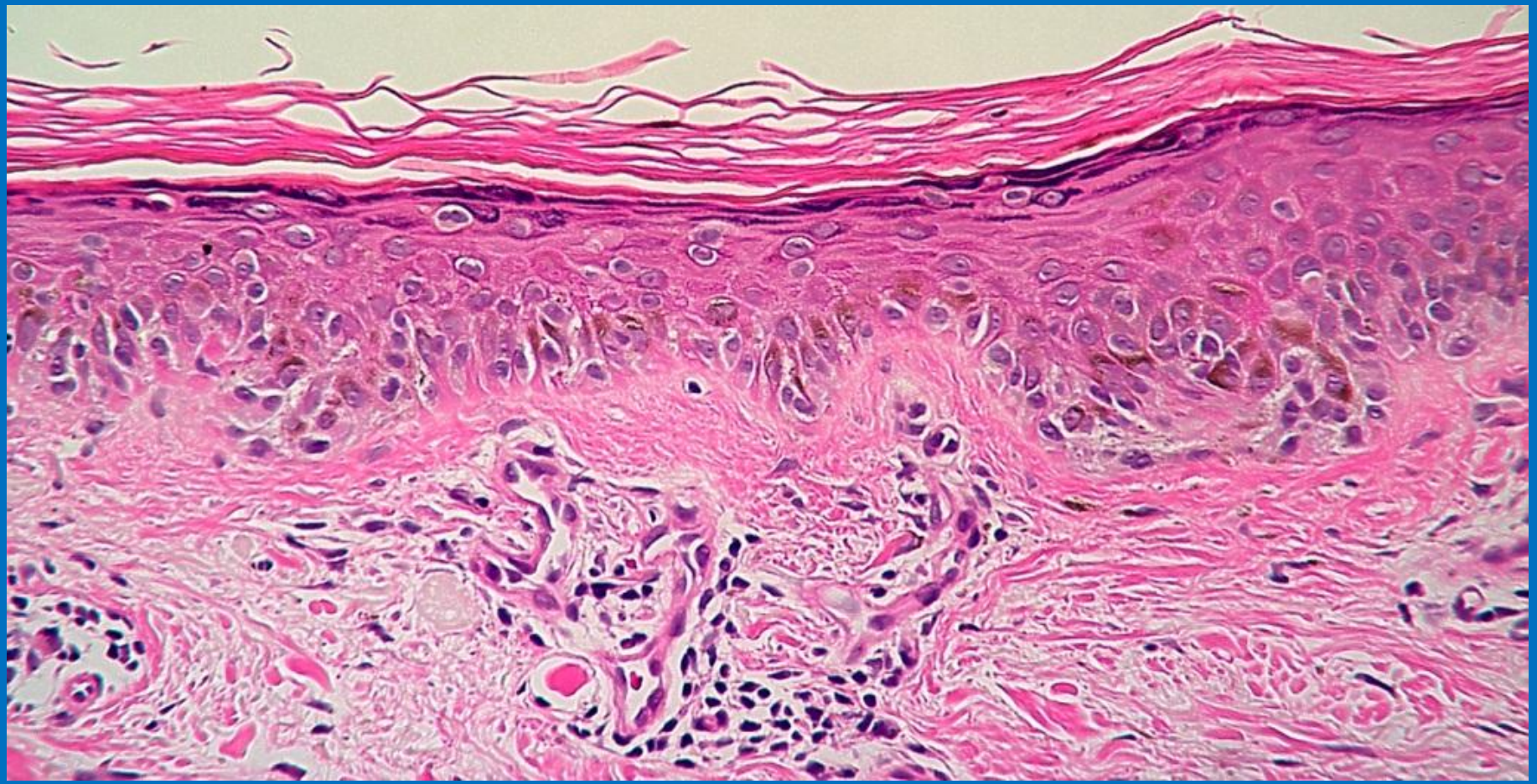


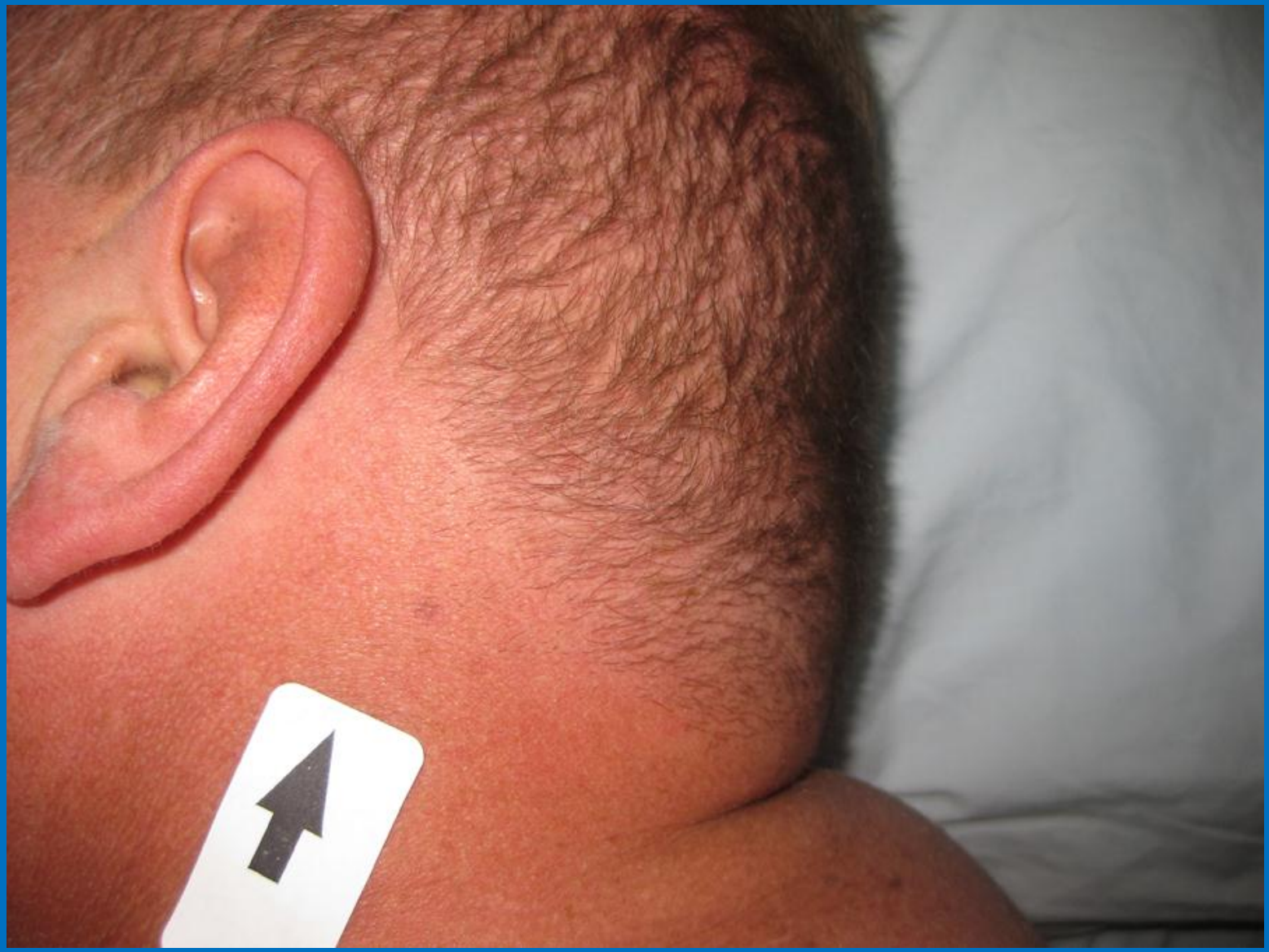
This tiny lesion “breaks the pattern” because while the seborrhoeic keratoses are all brown, raised and rough it is grey, flat and smooth. It is an in-situ melanoma.



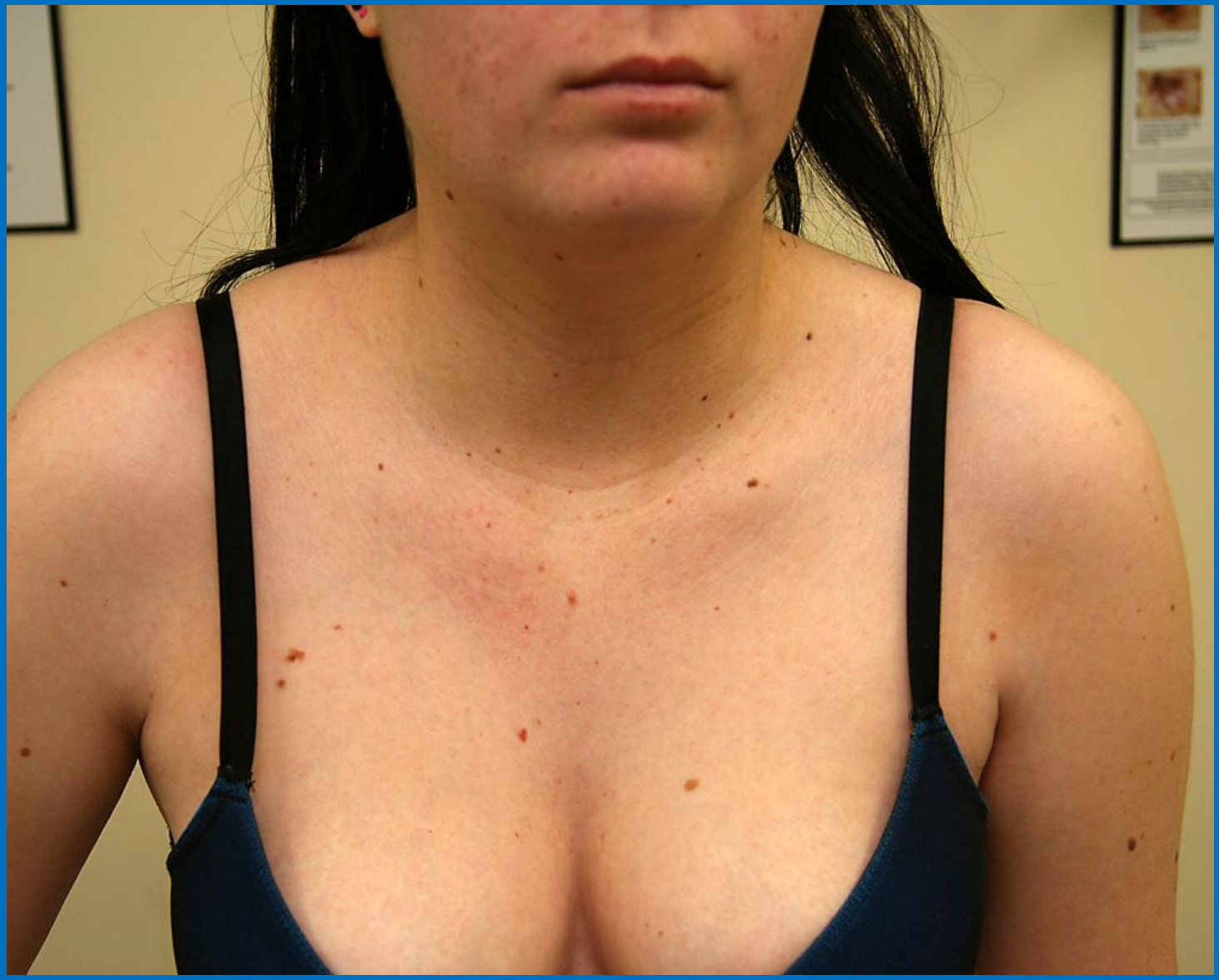
A “rectangular” lesion is not expected
It is an in-situ melanoma

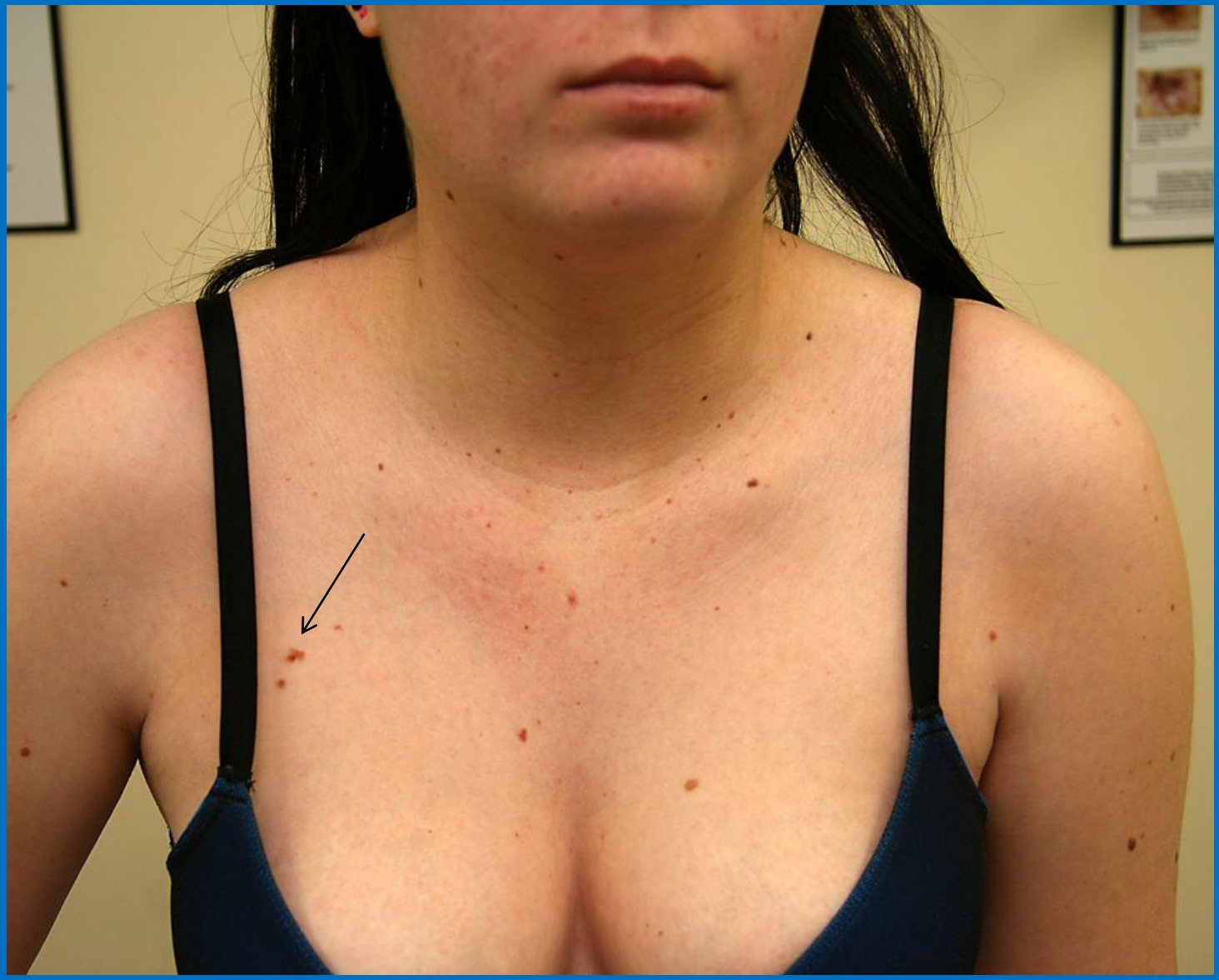




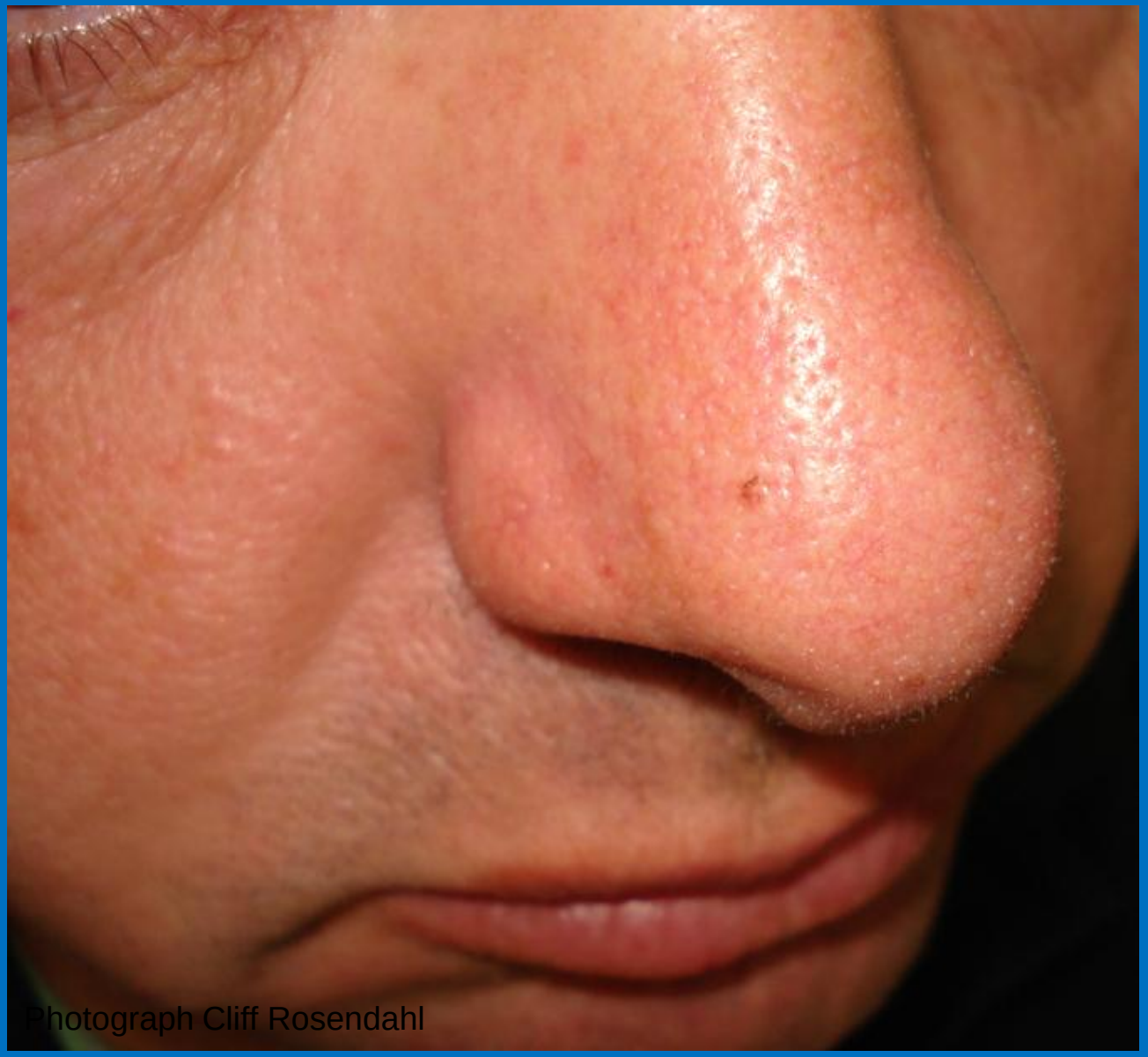


It is not an “ugly duckling” but it breaks the pattern. Invasive melanoma Breslow 0.55mm

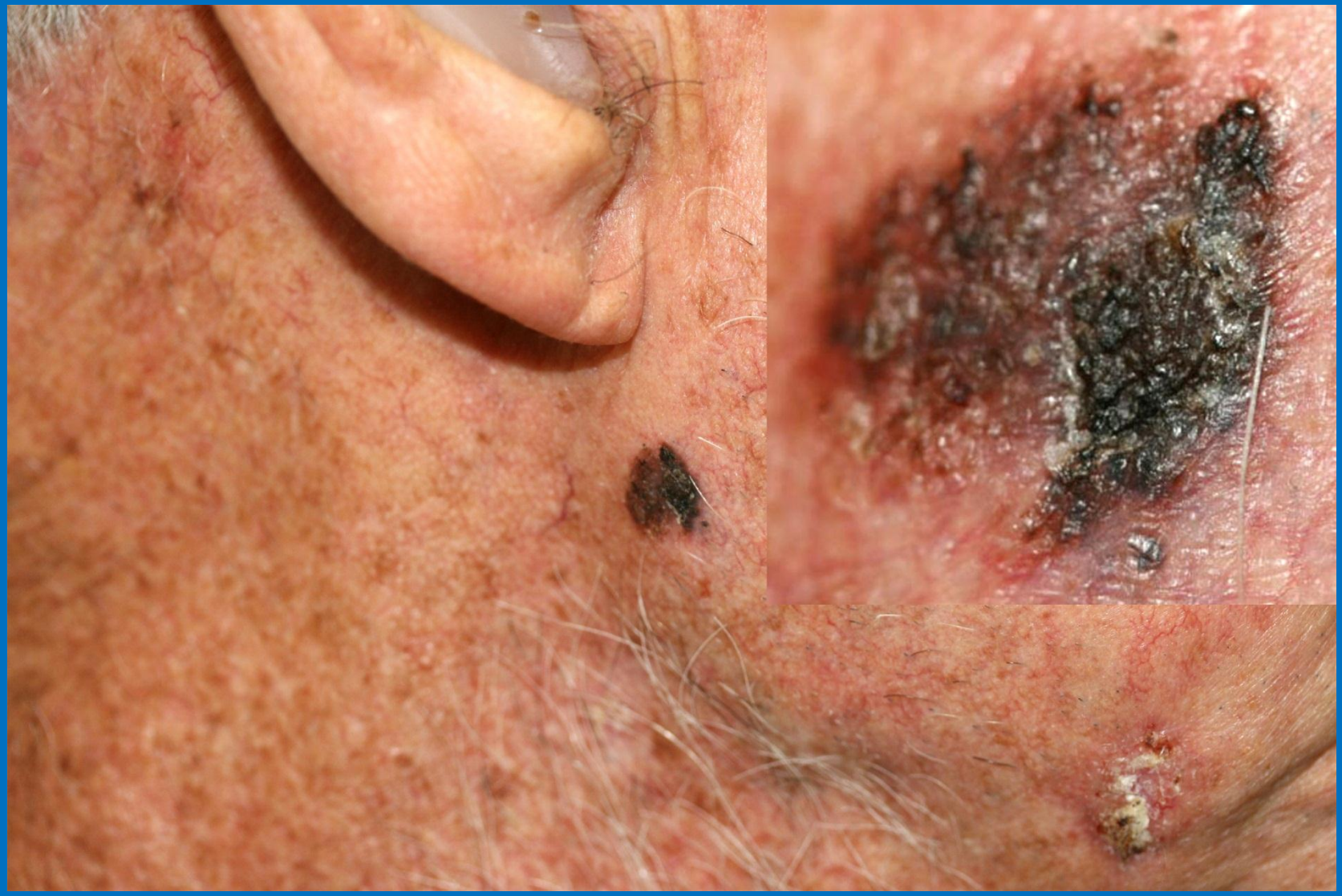


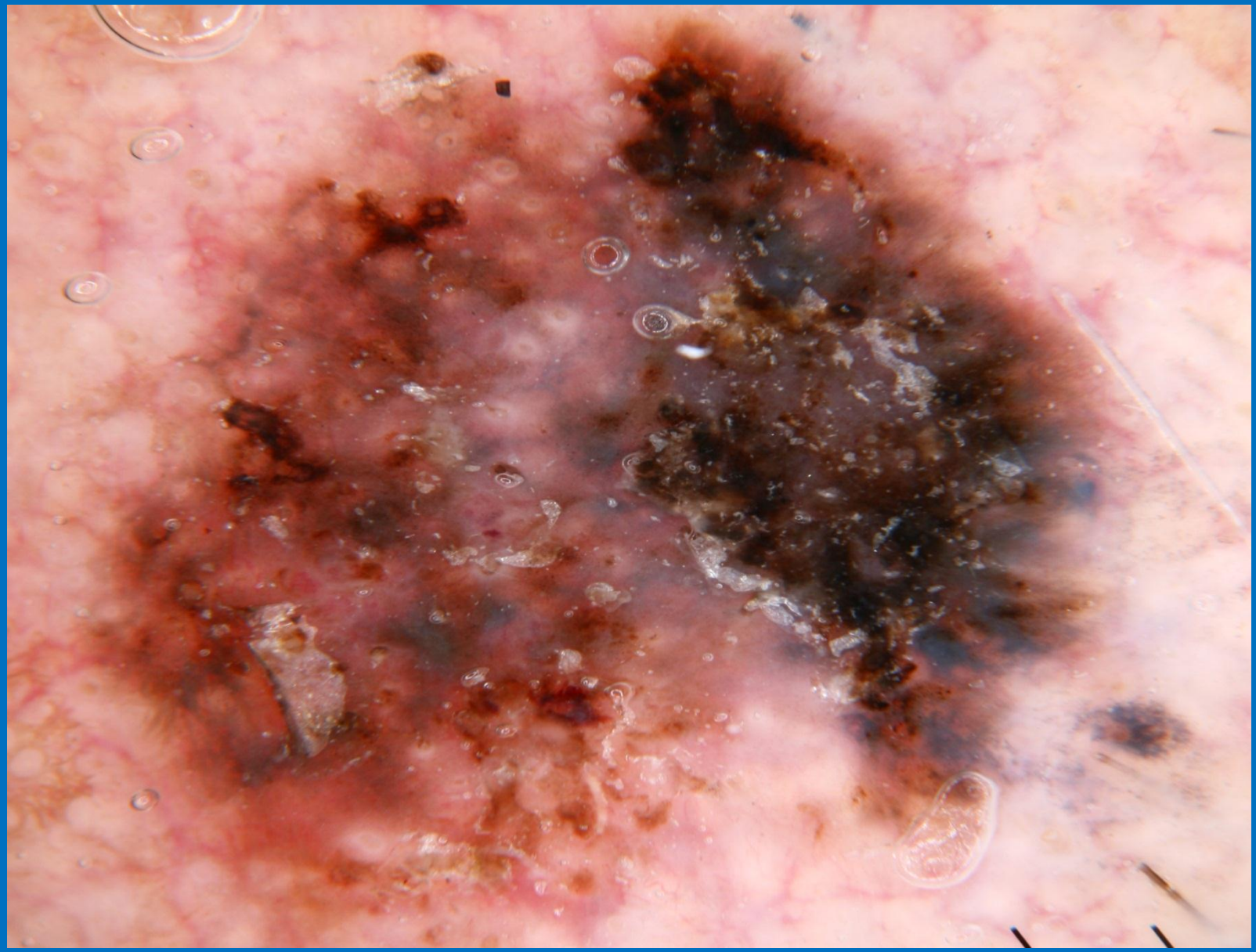


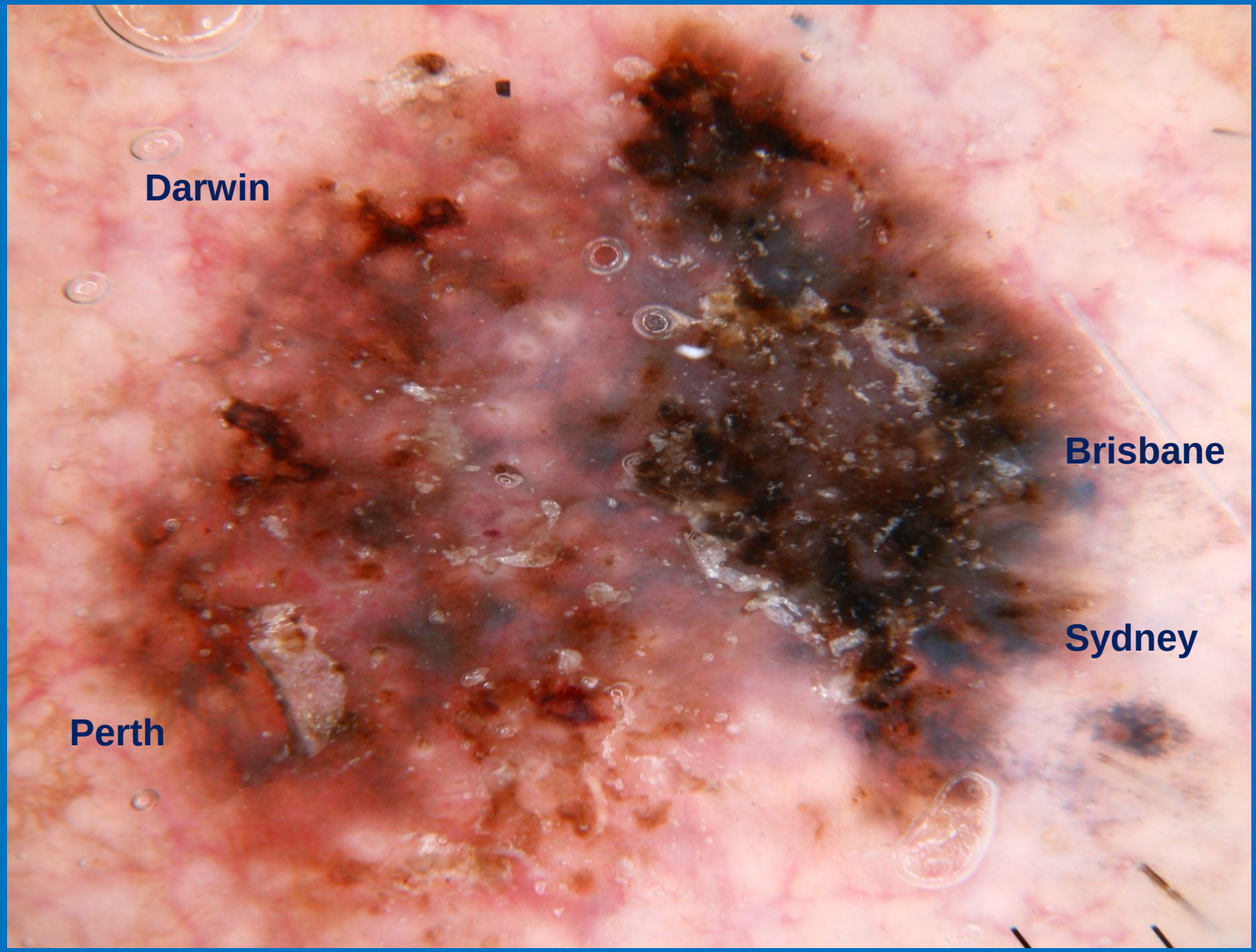
Invasive melanoma Breslow 0.40 mm on a 20 year old



In-situ melanoma 1.6 mm in diameter







Be very suspicious when a lesion looks like an evolved or created complex object. That is not expected in a benign lesion.

Chaos & Clues

Why scan for chaos ?

By eliminating non-chaotic lesions you are increasing the prevalence of the condition in the sample investigated

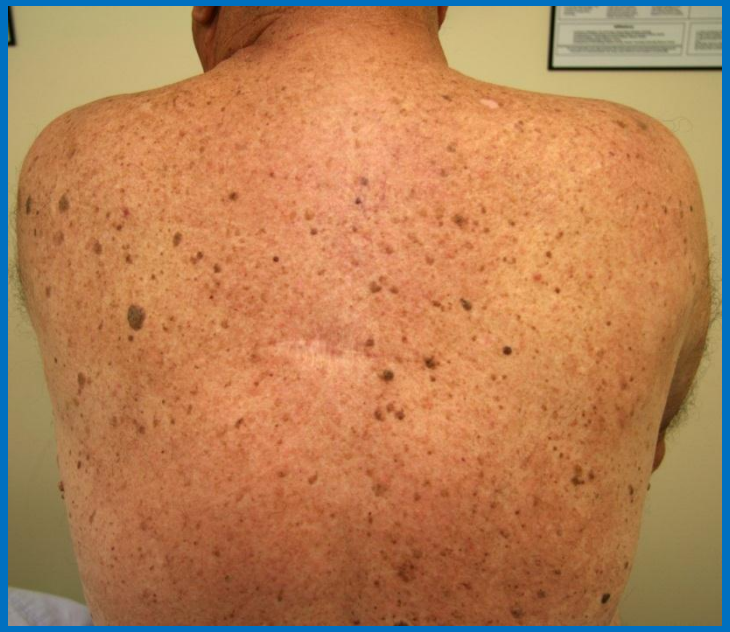
For a given specificity this increases the Positive Predictive Value (PPV)

This reduces the number of benign lesions at risk of biopsy

Method Chaos & Clues

90% sensitivity

70% specificity



Sample size **500**

1 melanoma detected (0.9 of 1)

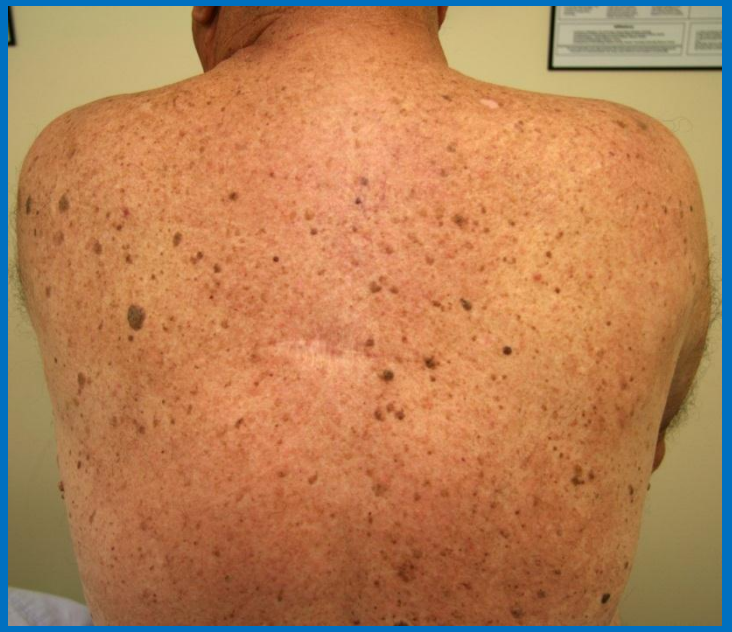
149 benign lesions excised? (30% of **499**)

PPV 1 in 150 = 0.6%

Method Chaos & Clues

90% sensitivity

70% specificity



Eliminate 490 non-chaotic lesions

Sample size **10**

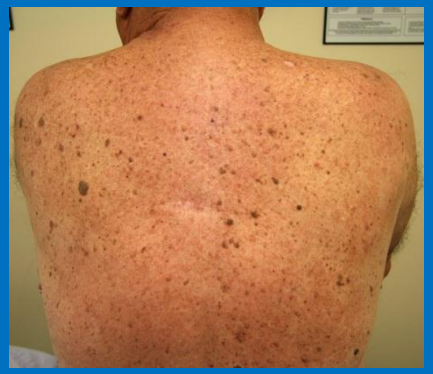
1 melanoma detected (0.9 of 1)

3 benign lesions excised? (30% of **9**)

PPV 1 in 4 = 25%

Step 1: is there chaos?

- SIMPLE



compared to complex as shown here in the first step of the alternative2-step method (melanocytic vs. non-melanocytic)

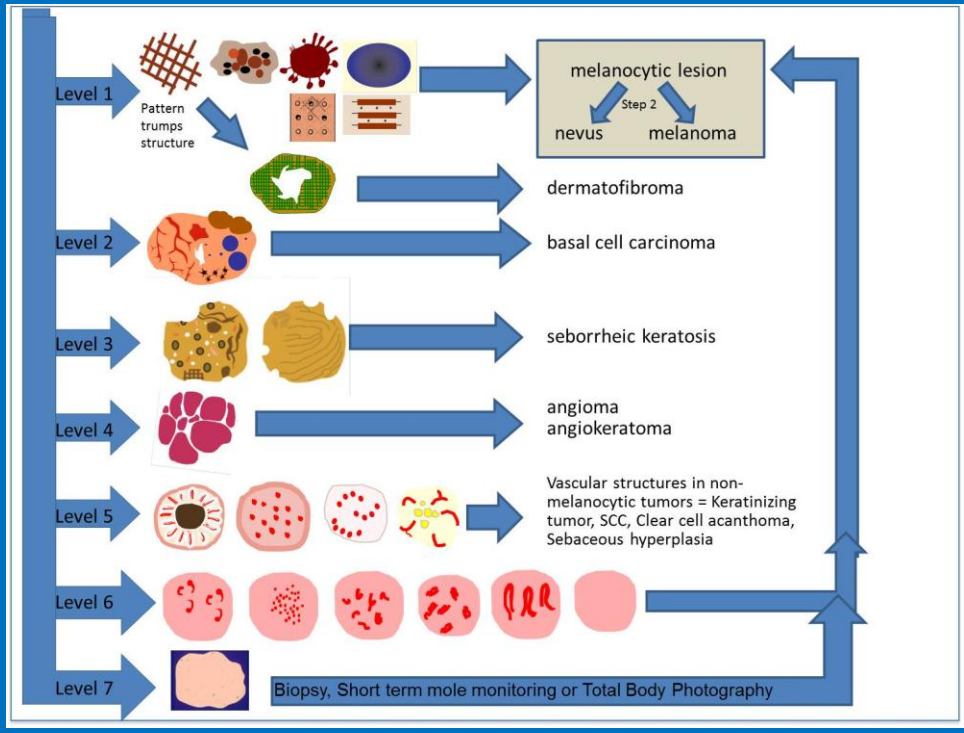
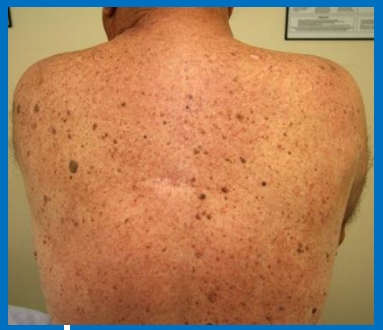
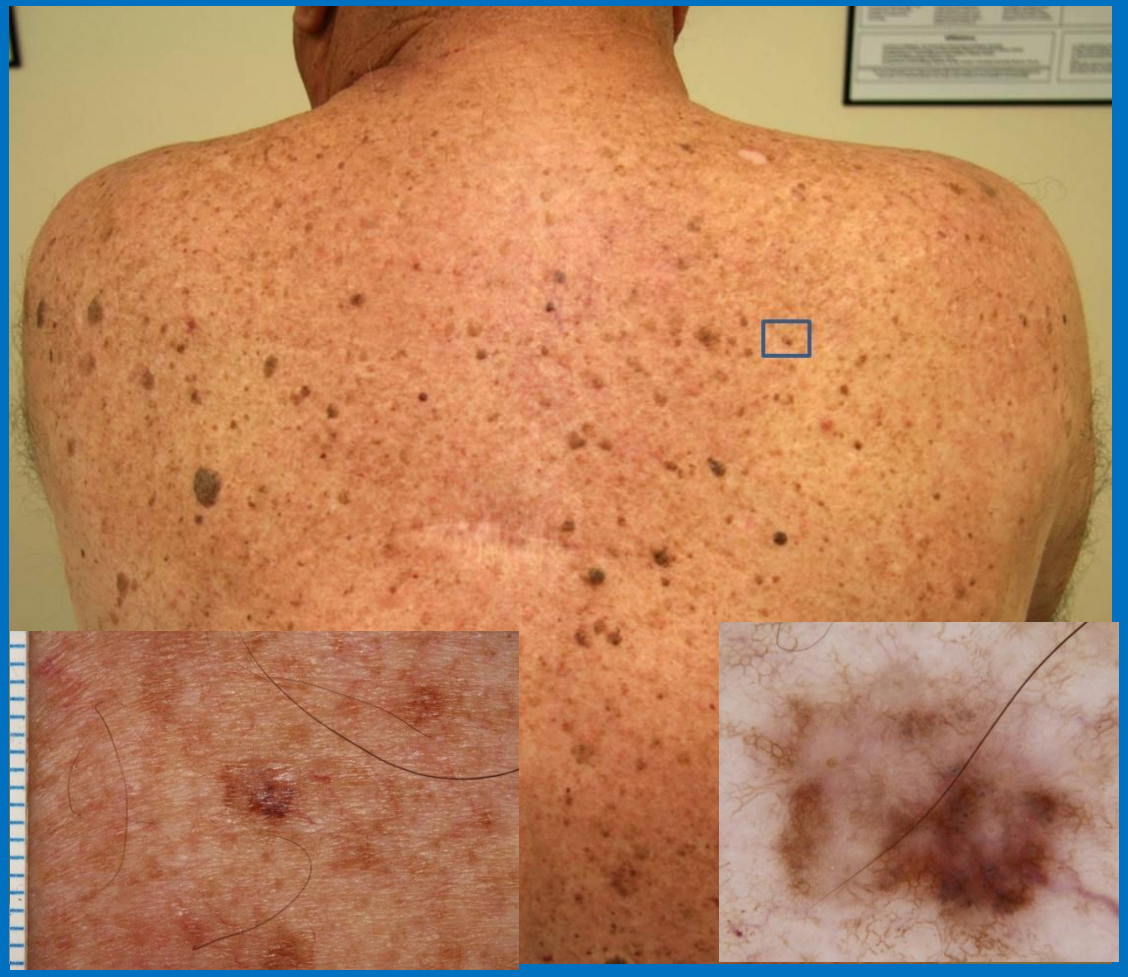


Image courtesy Ashfaq Marghoob

Step 1: is there chaos?



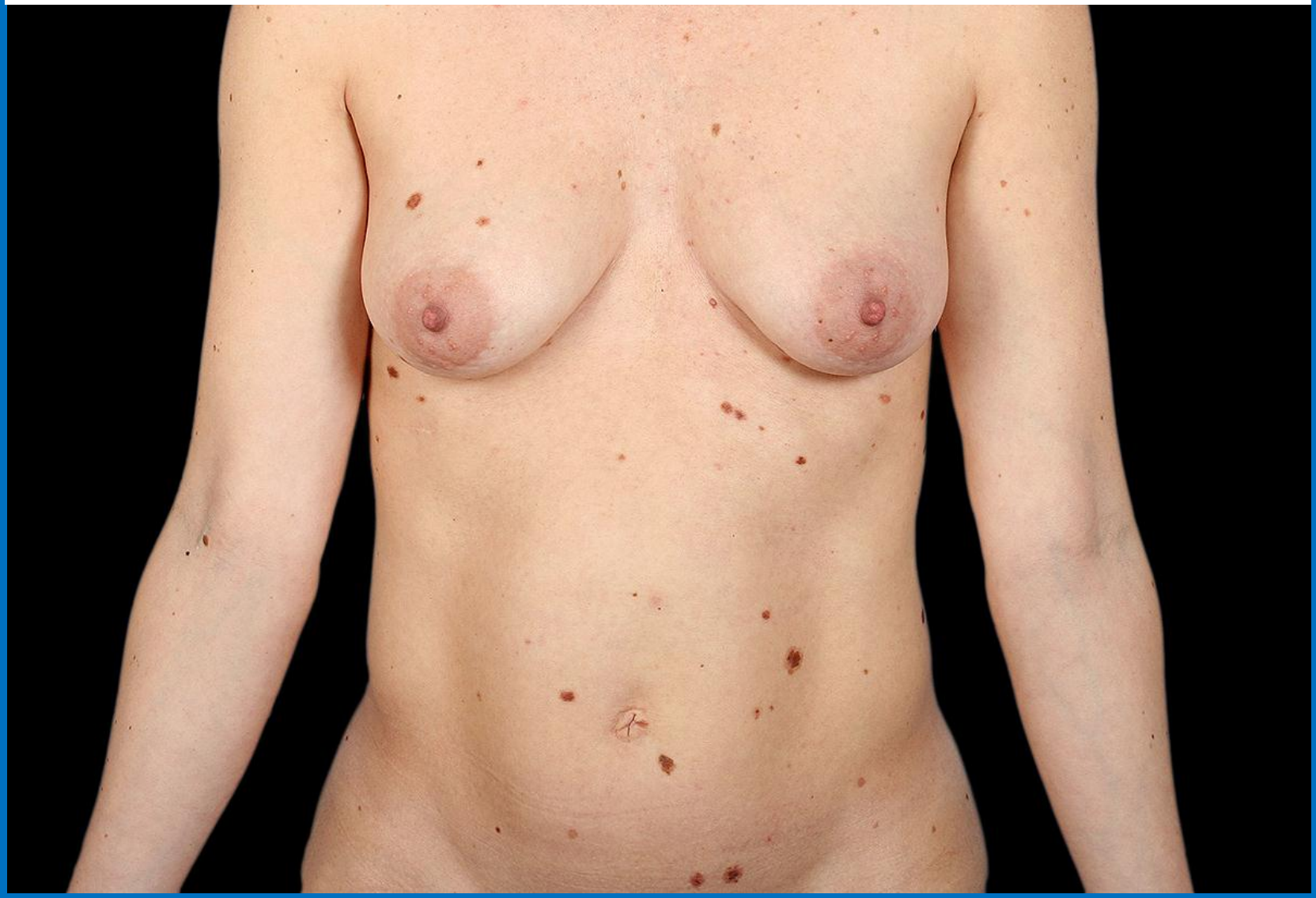
- SIMPLE
- To reduce number of benign lesions in sample
- Increase pre-test probability
- Increase Positive Predictive Value
- Increased Specificity without sacrificed Sensitivity?



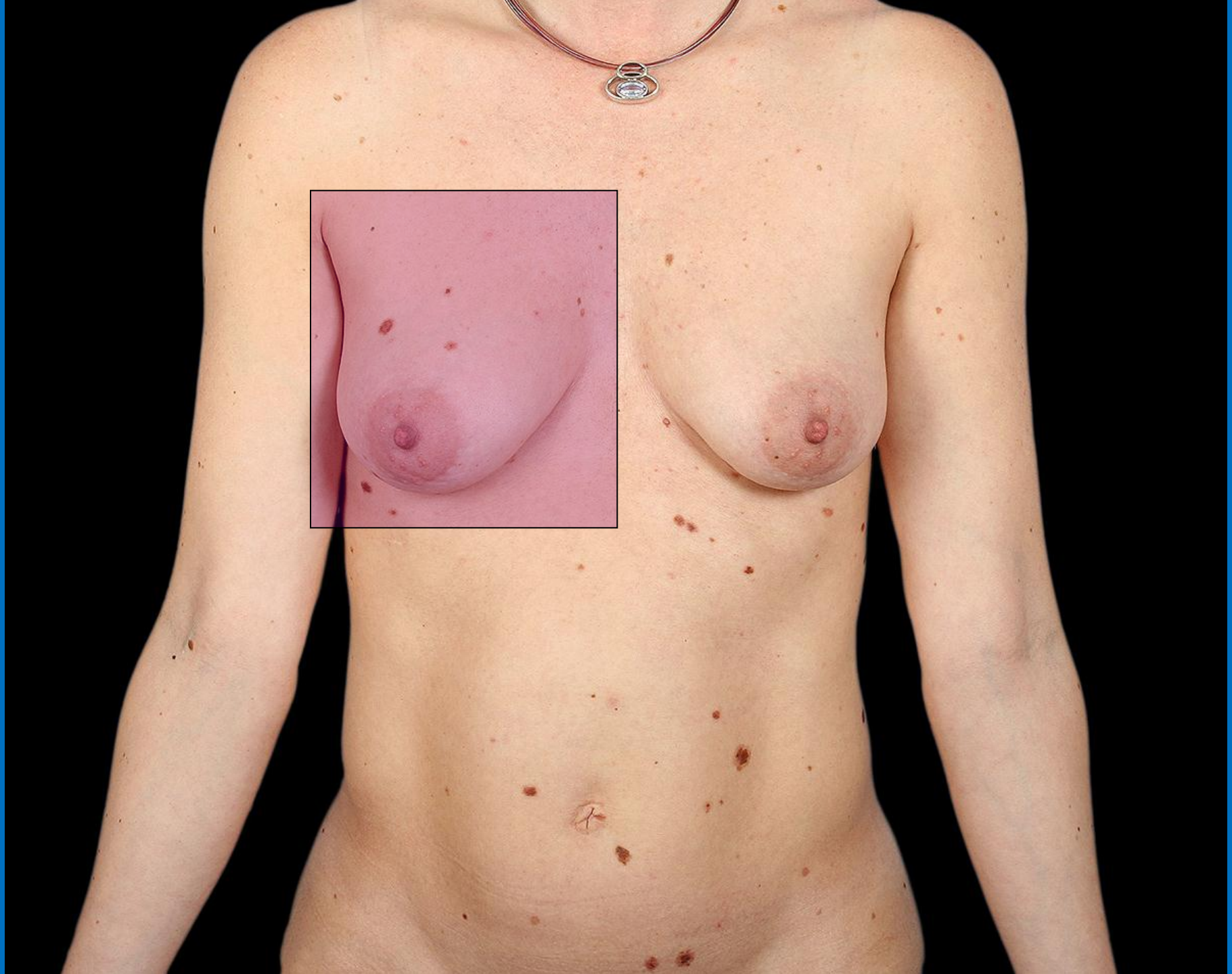
Dermatoscopy reduces this risk!

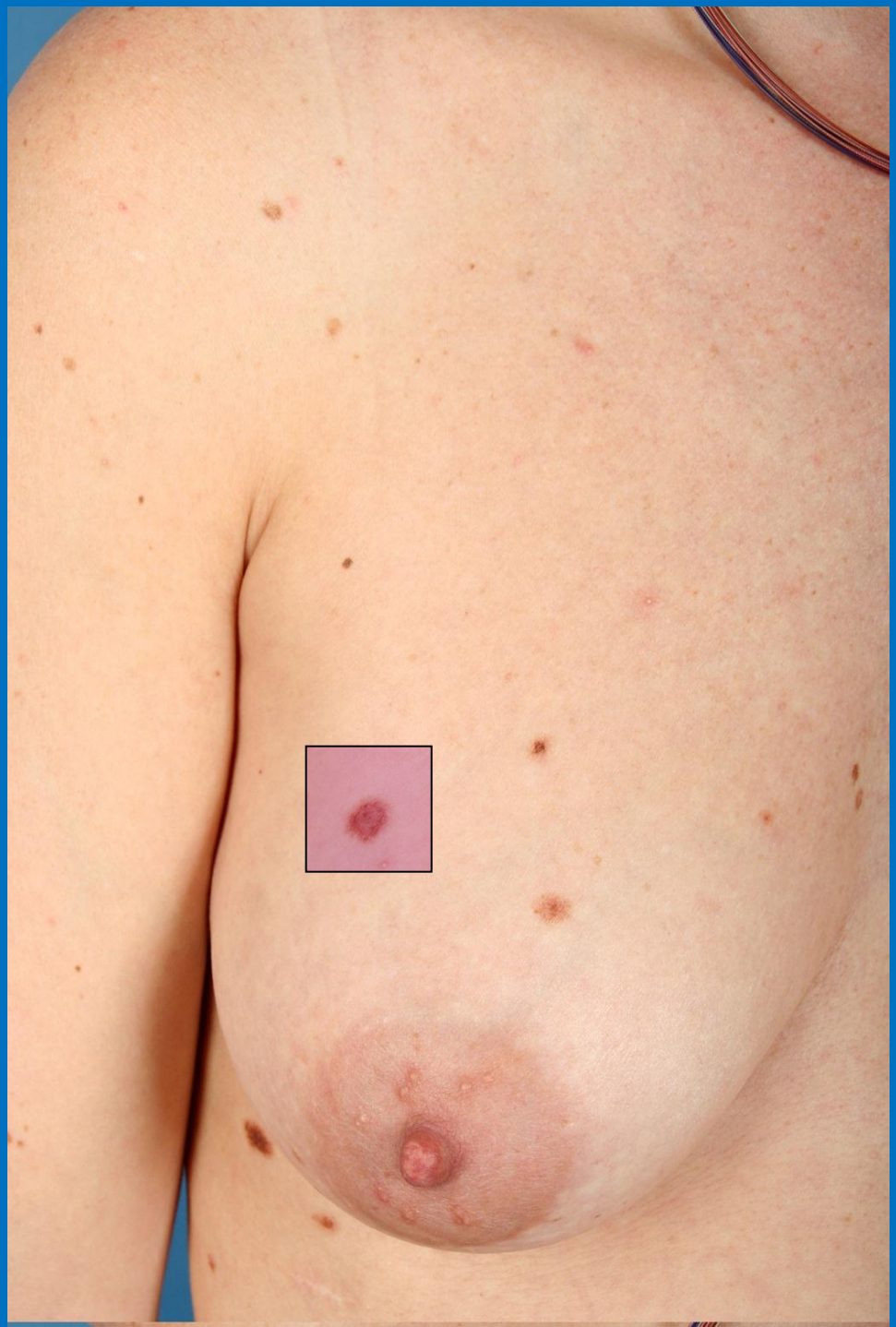
of throwing out the melanoma with the benign lesions…

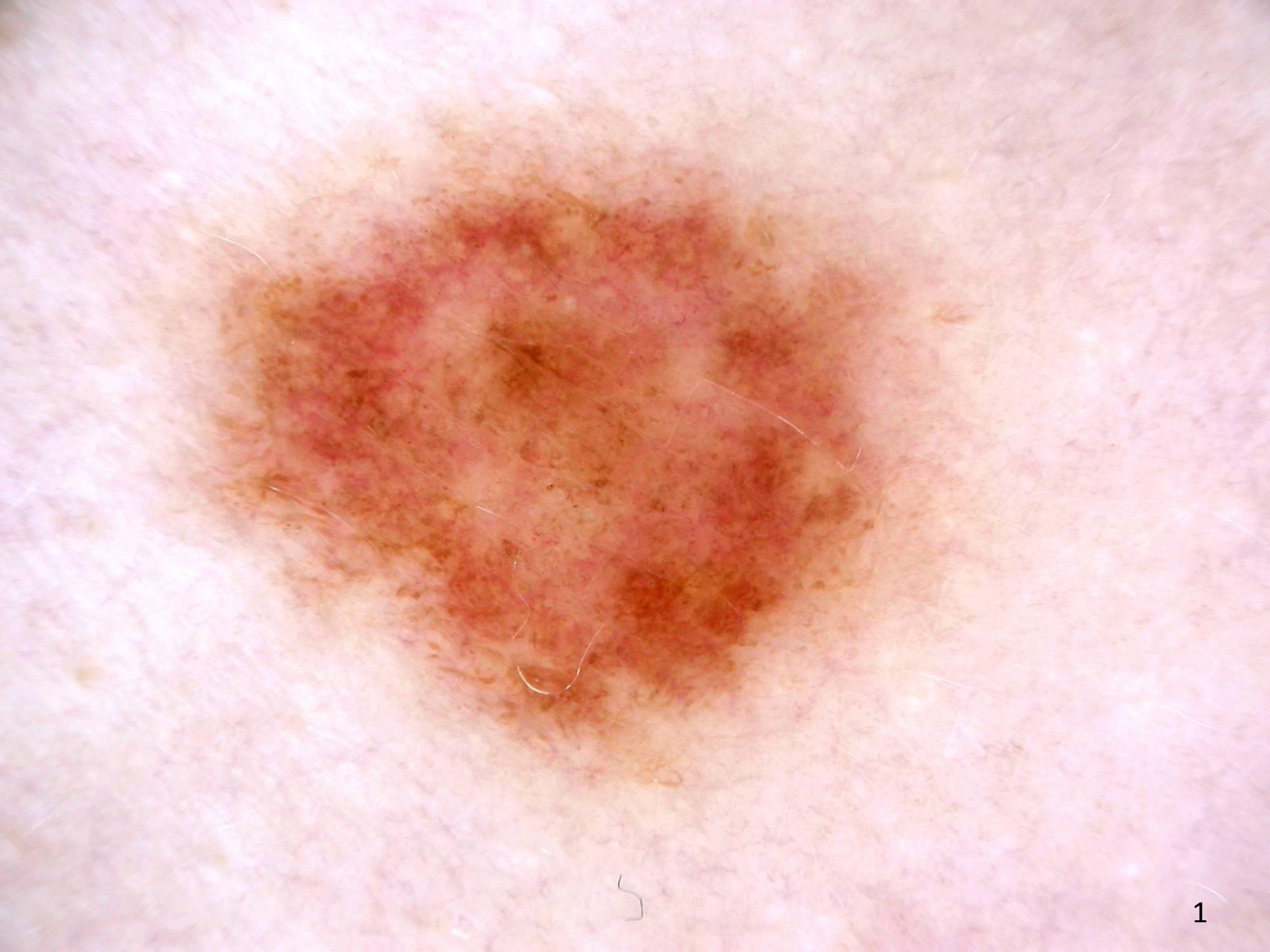
Select which lesions are not chaotic (symmetric by pattern regardless of shape) to see how this first step eliminates benign lesions from the test sample and increases the positive predictive value of the method.

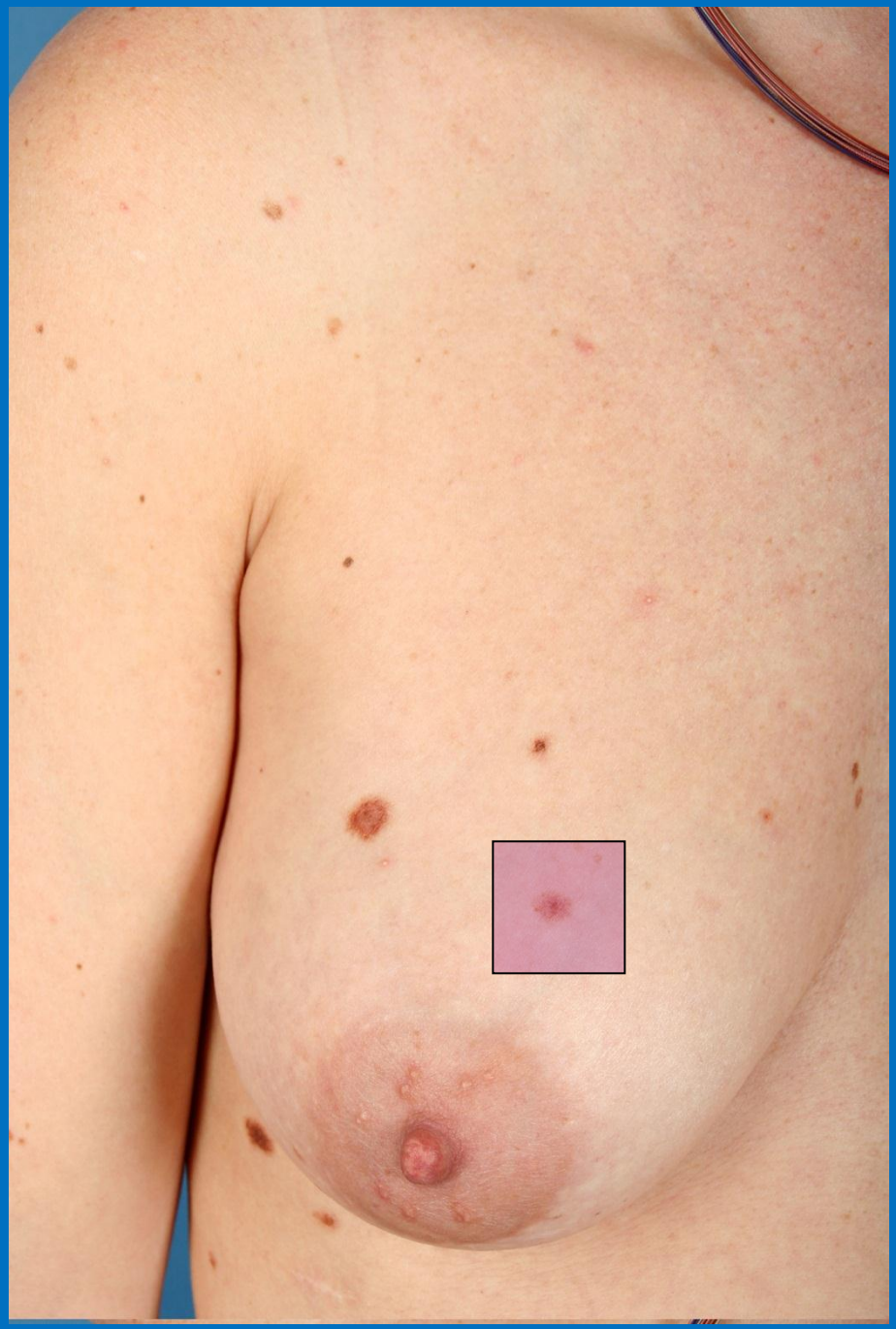


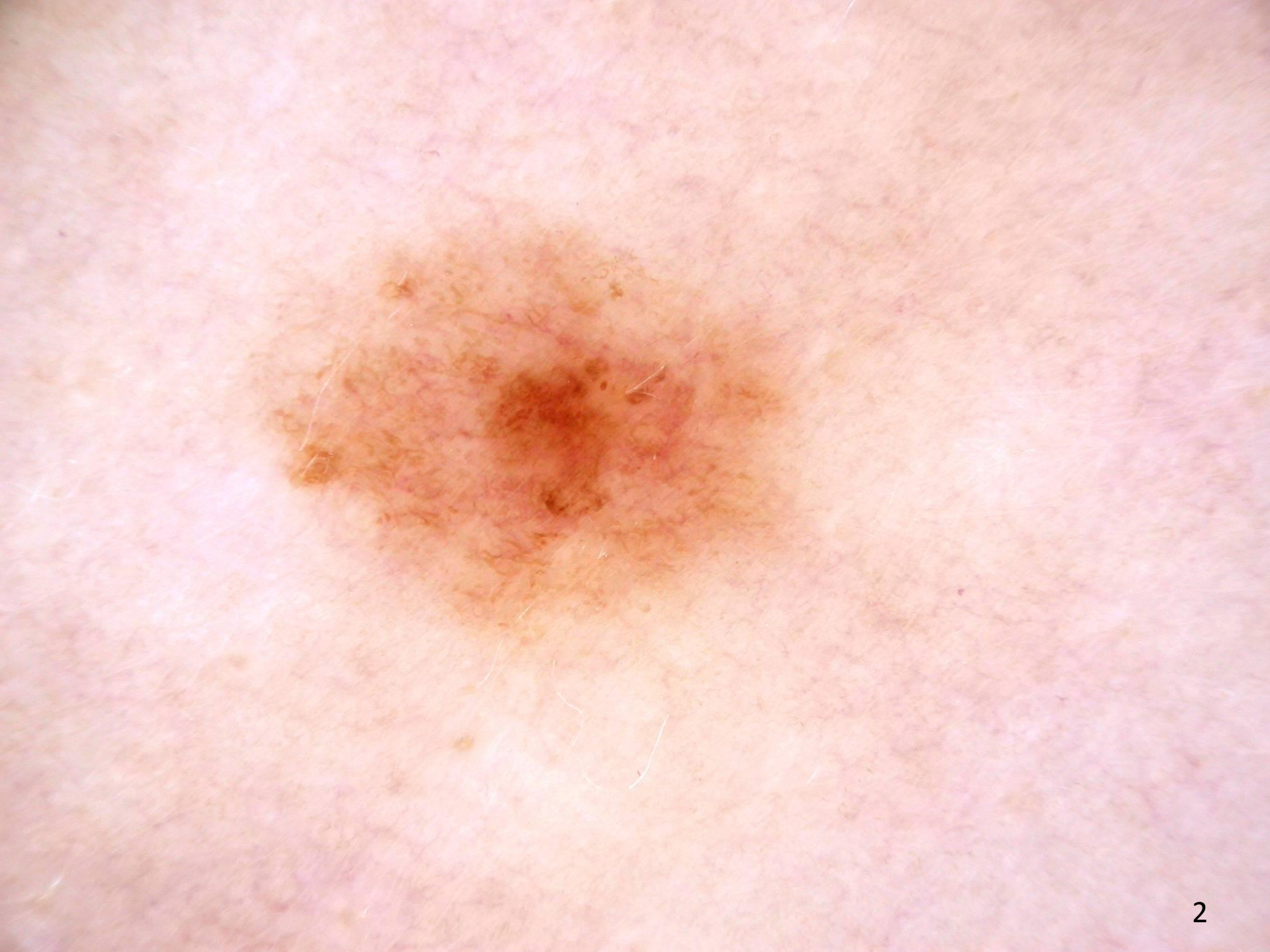
Images courtesy Harald Kittler

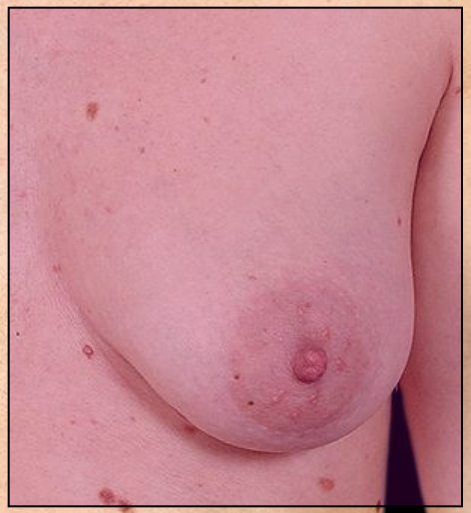


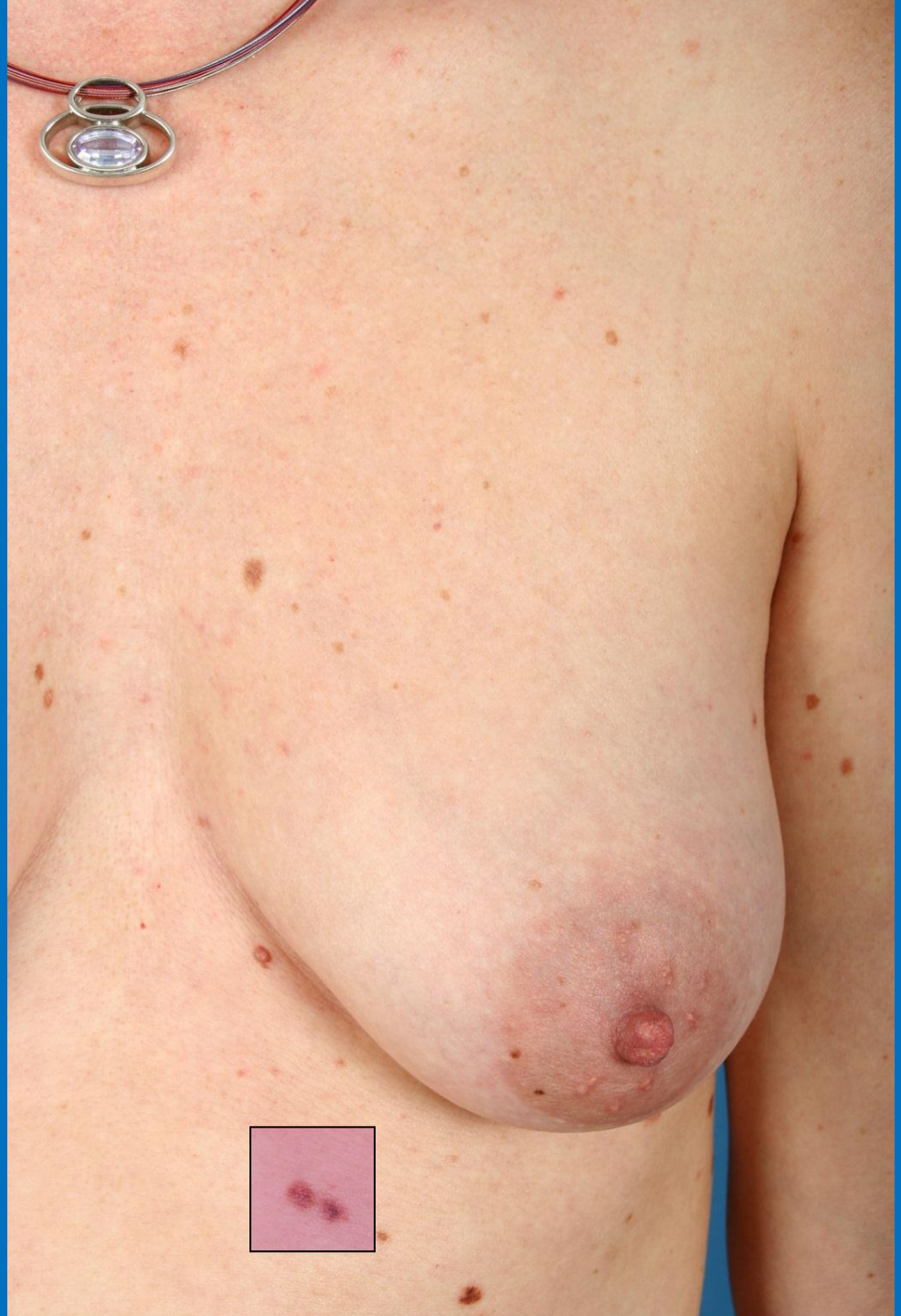


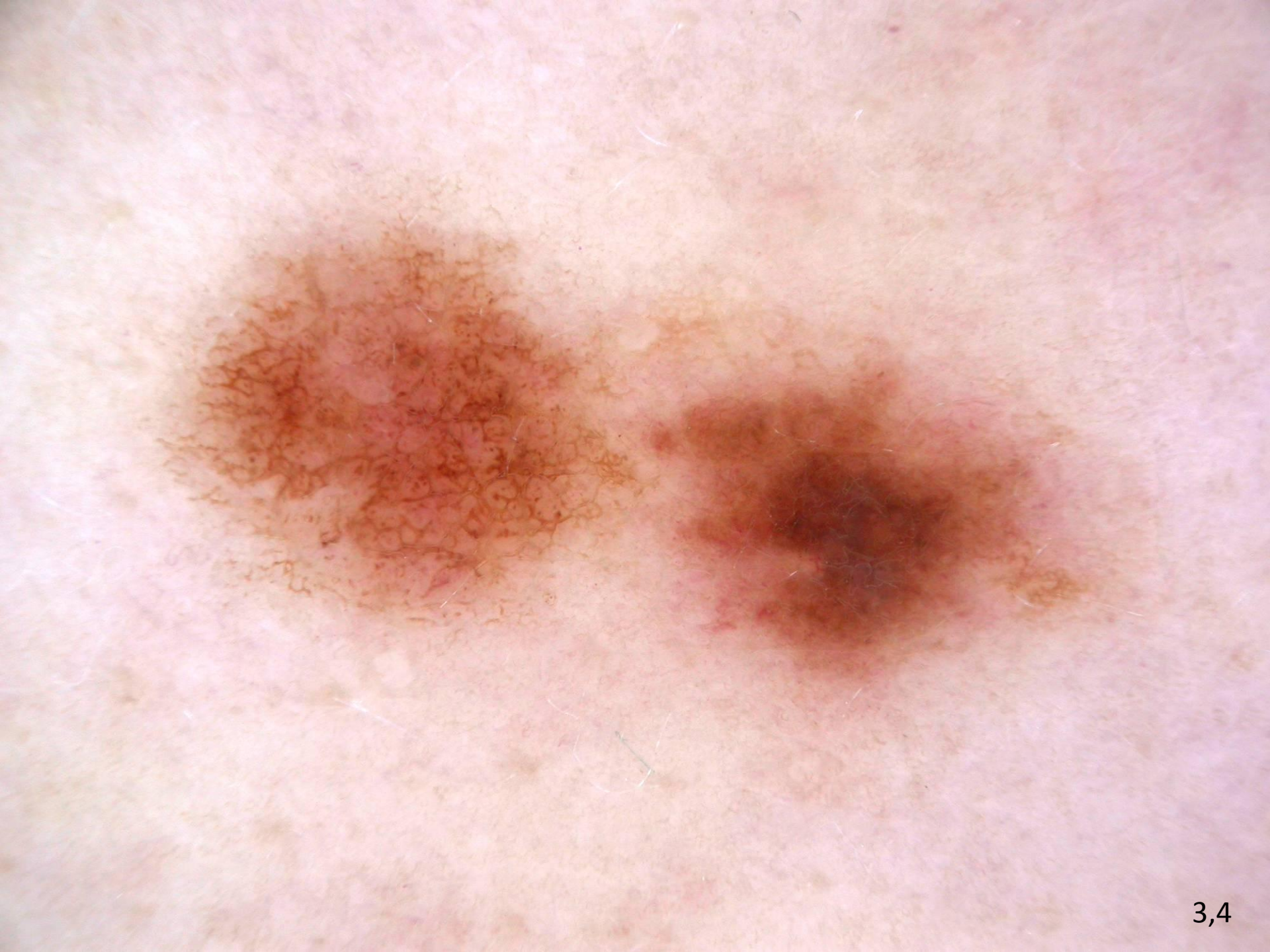












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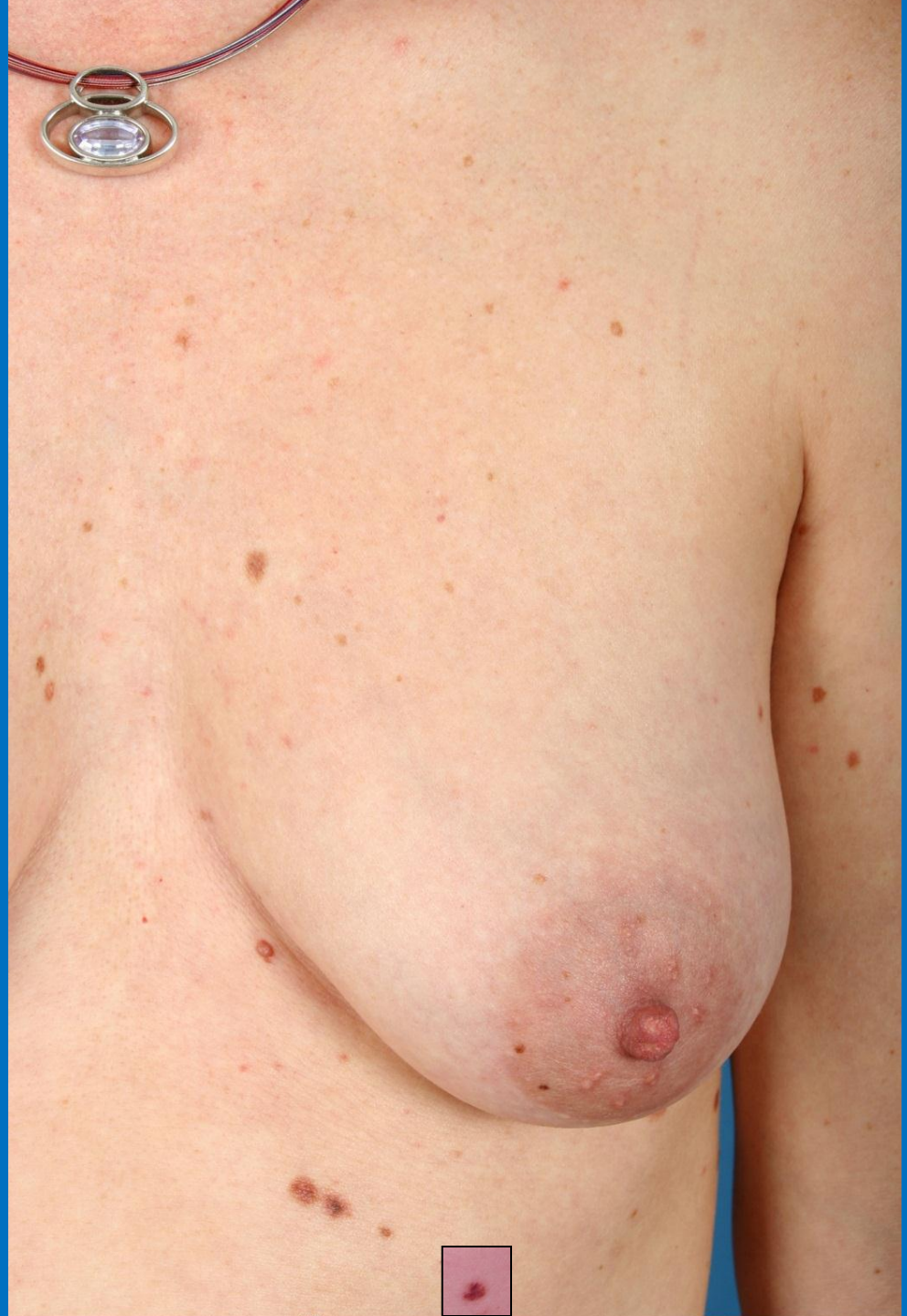
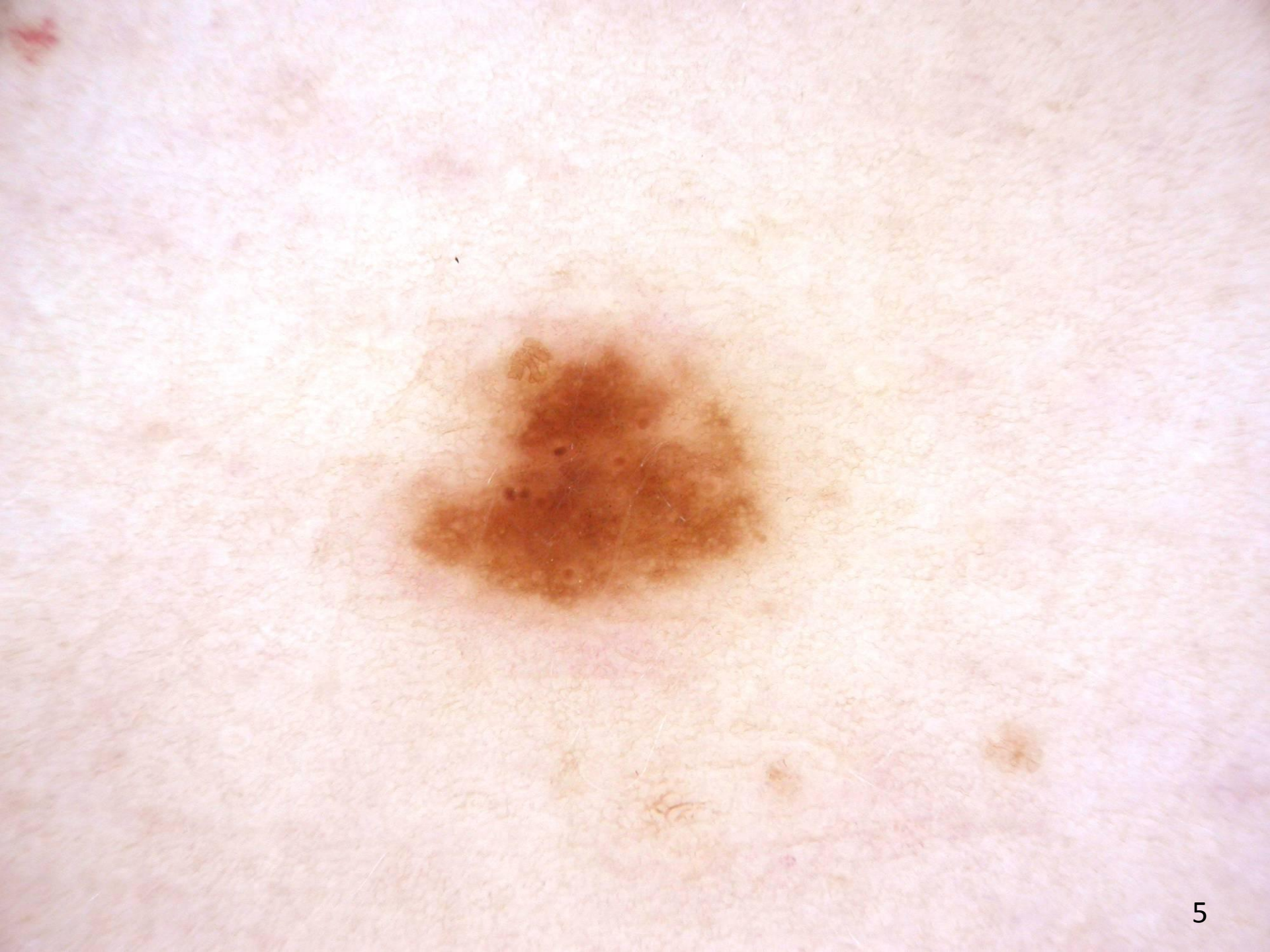
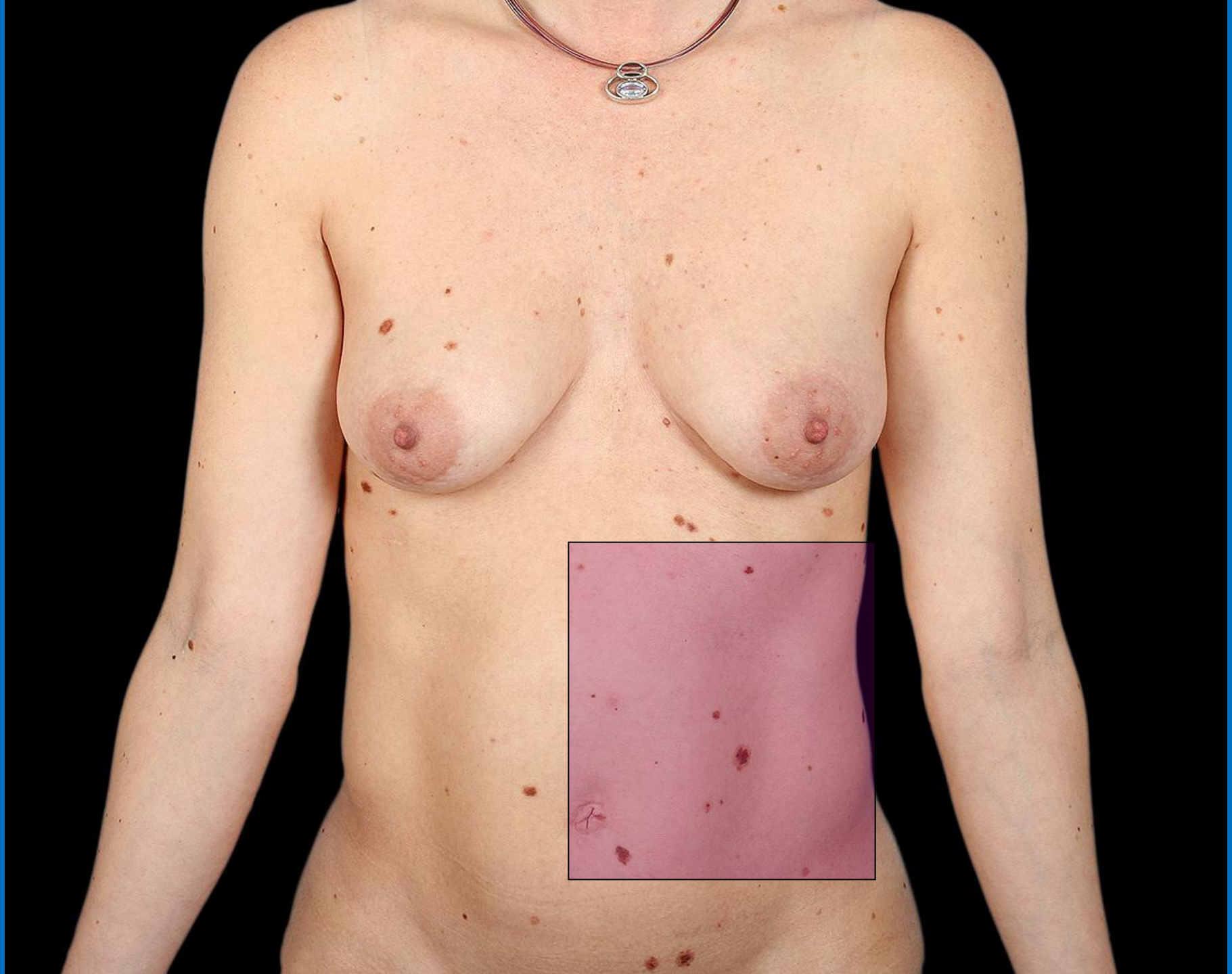
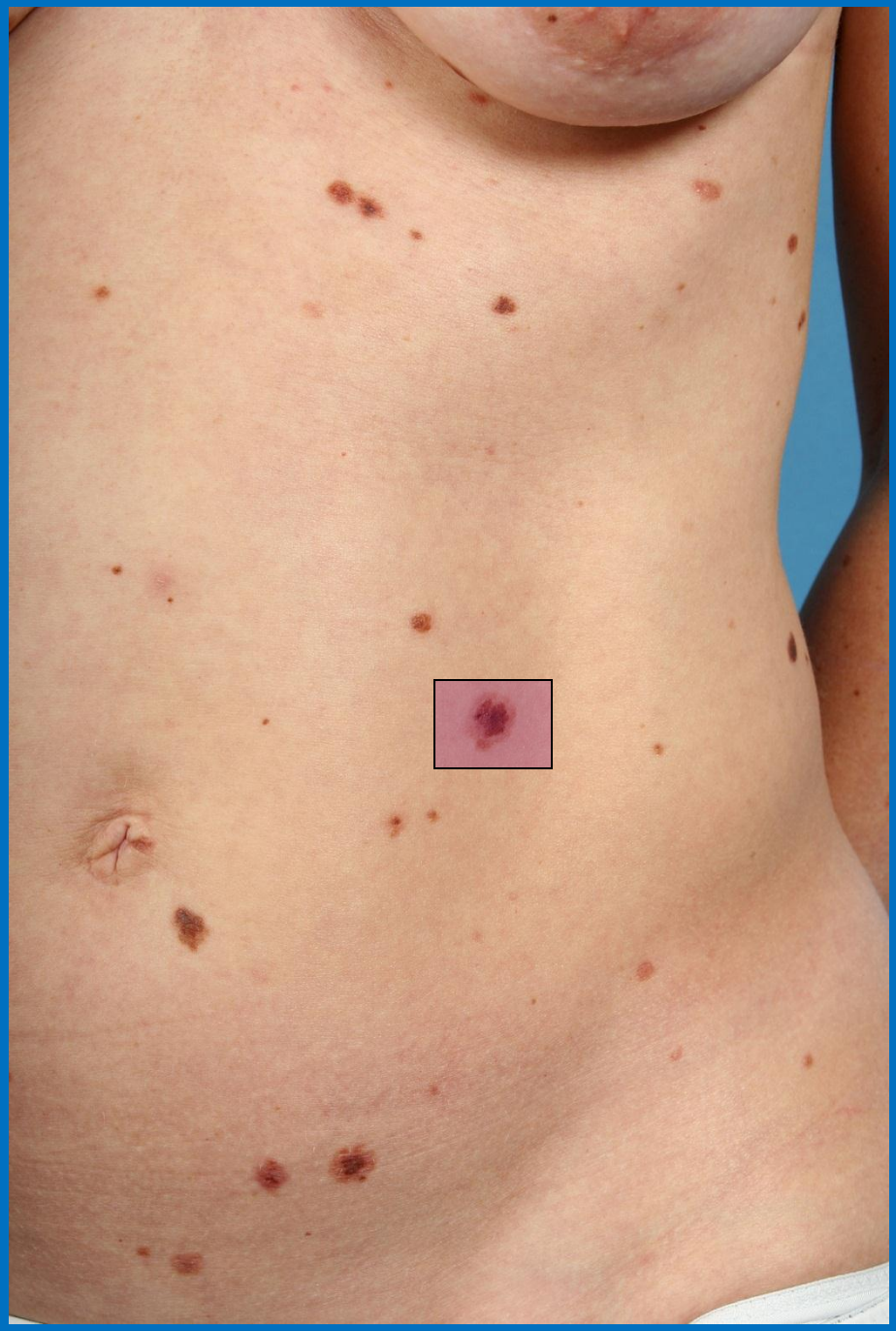
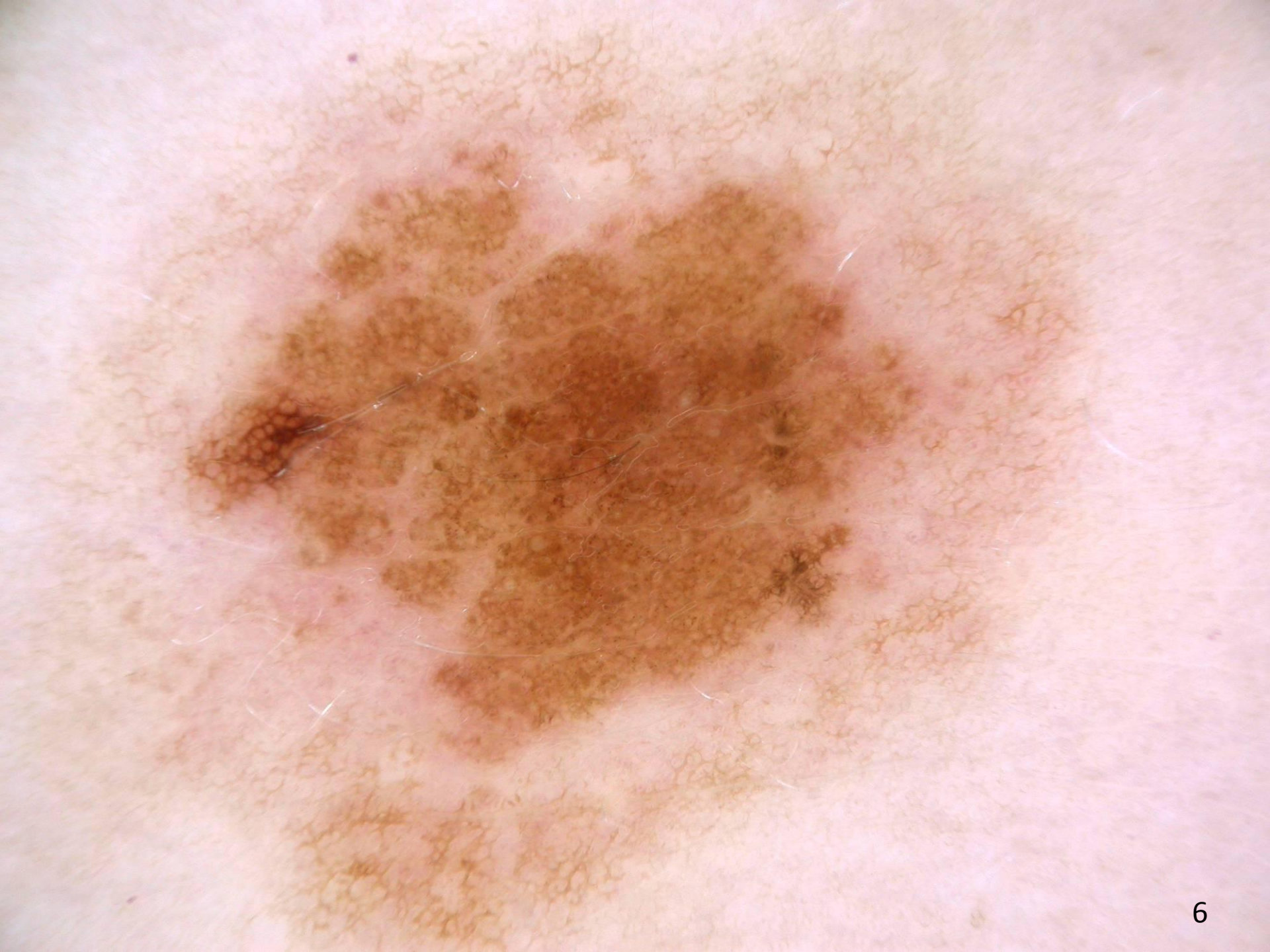
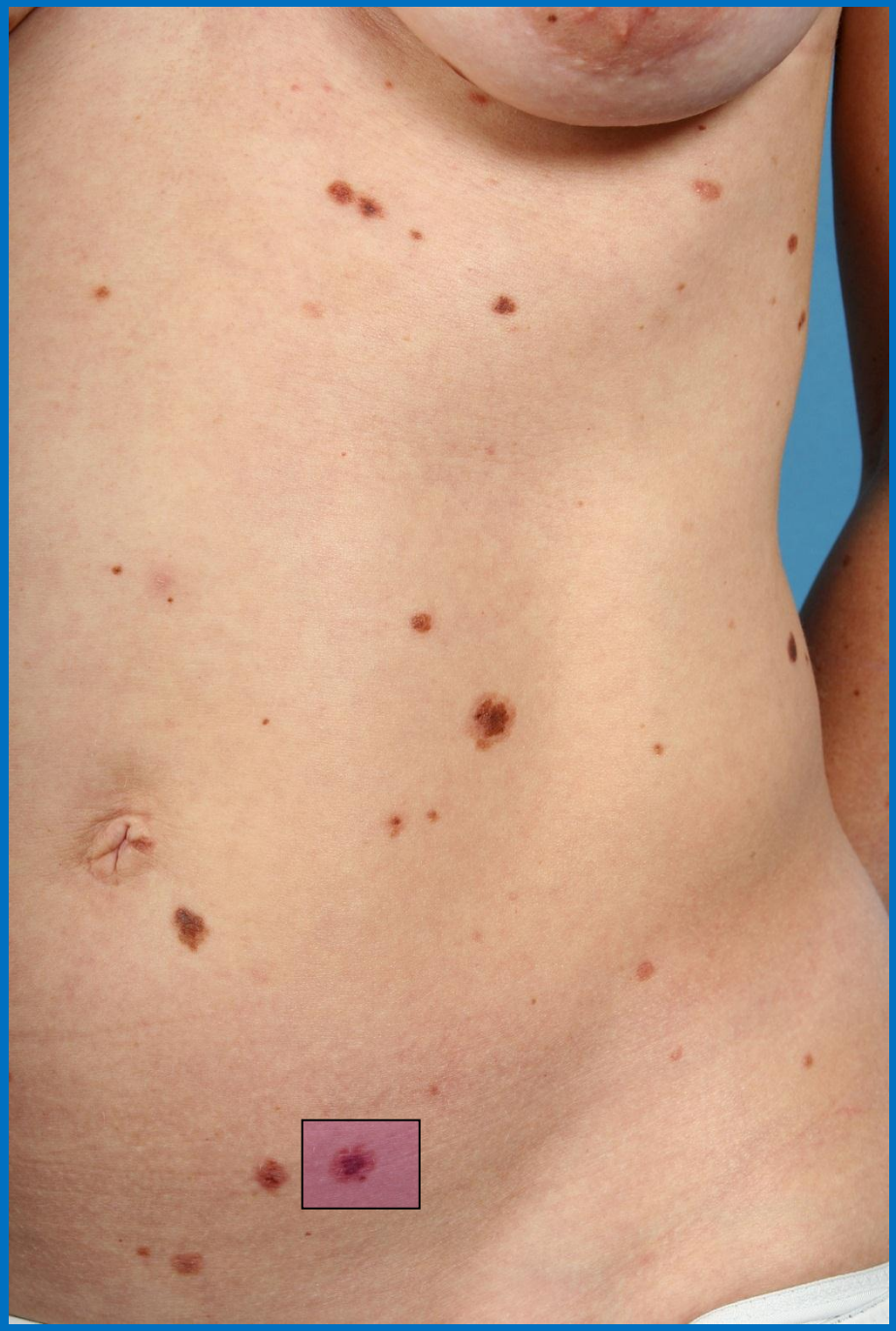


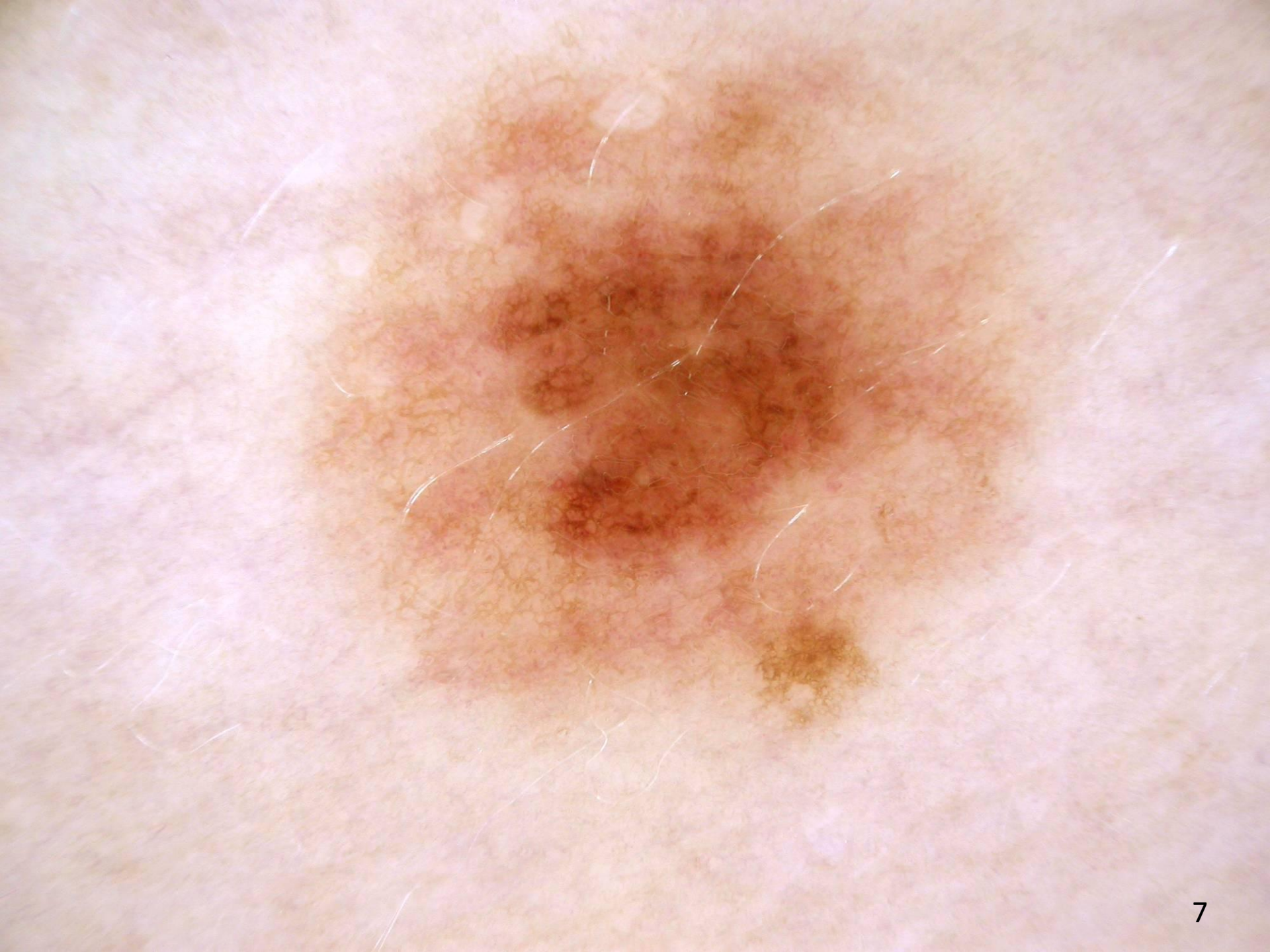


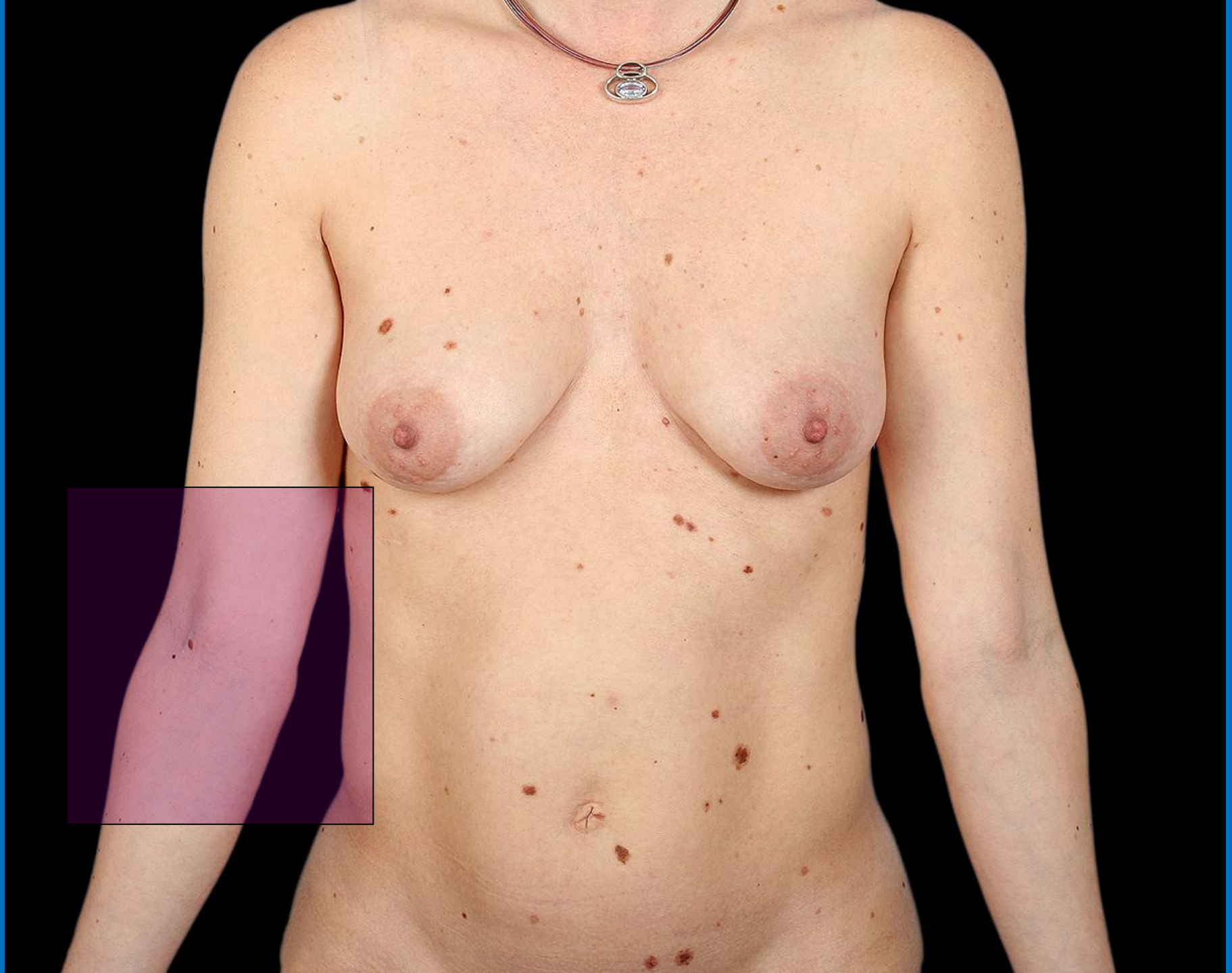


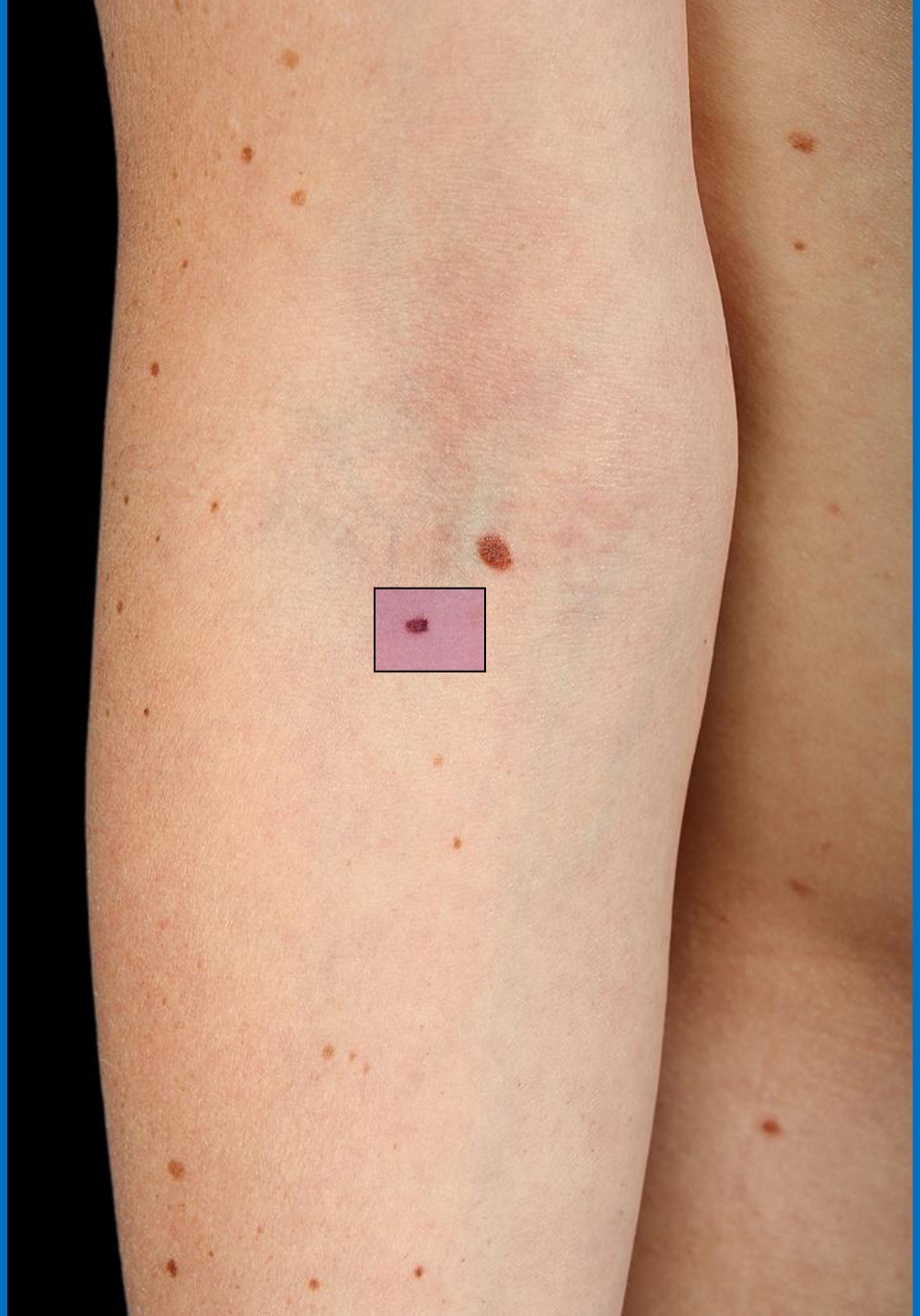


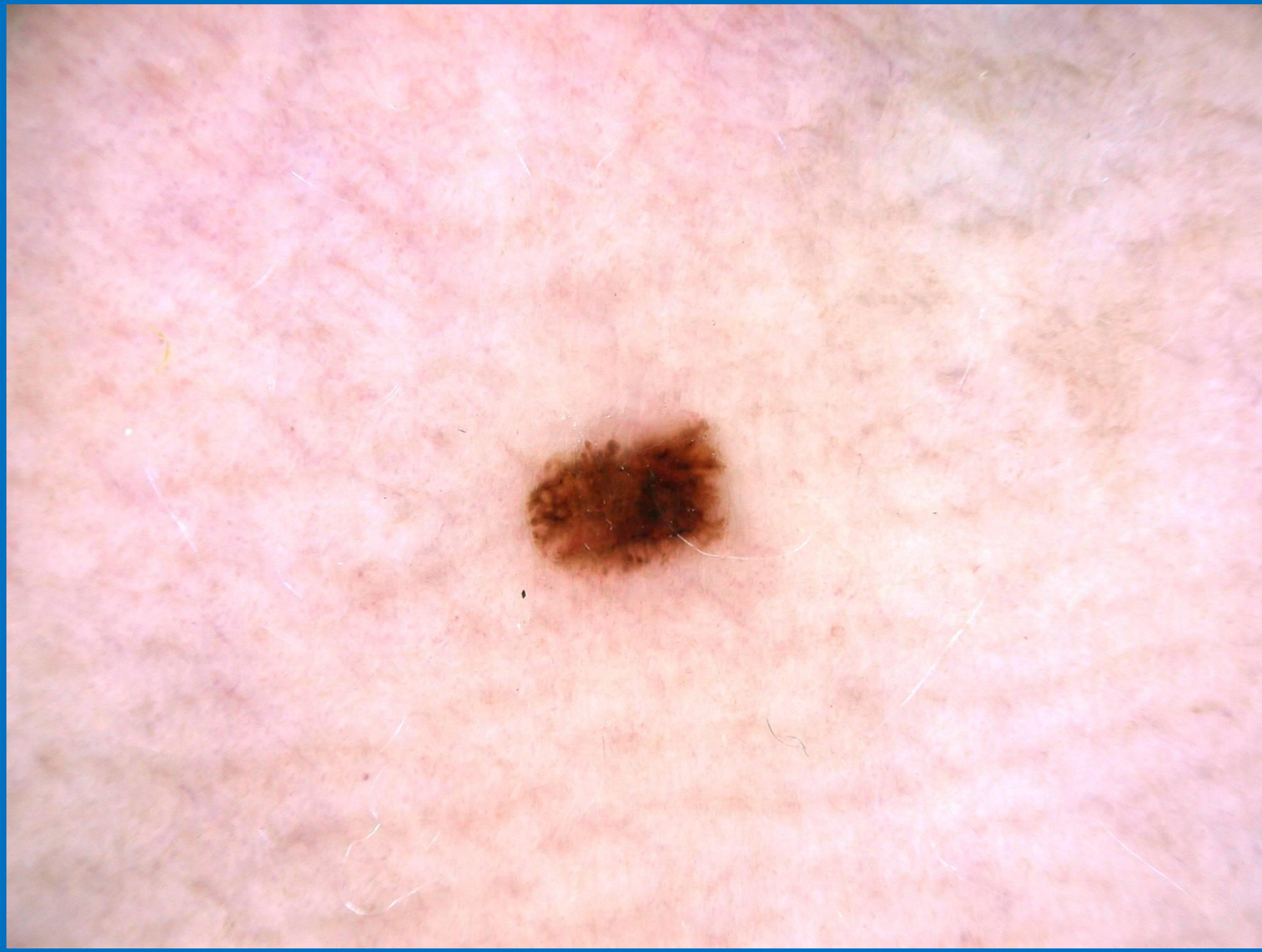


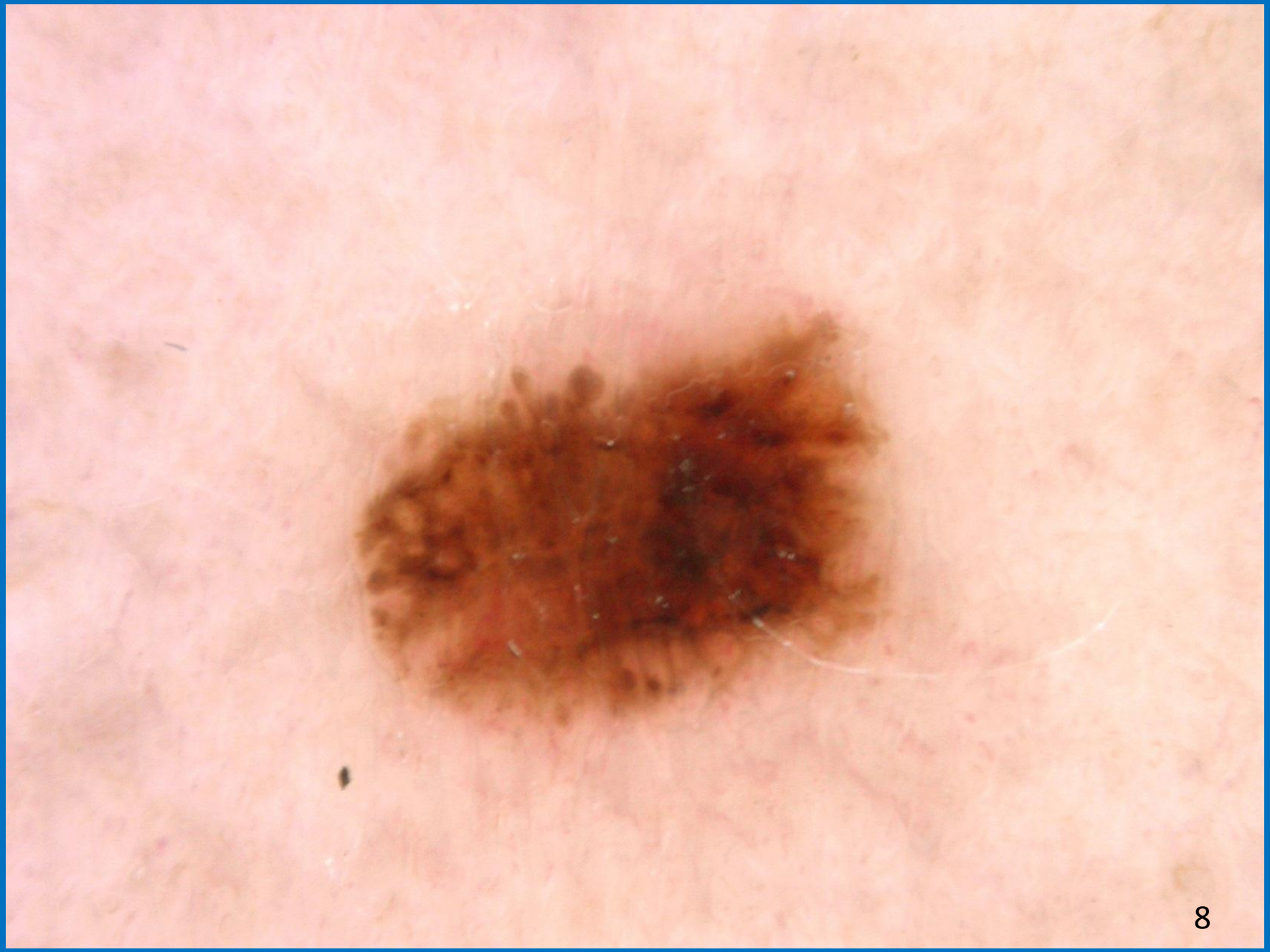


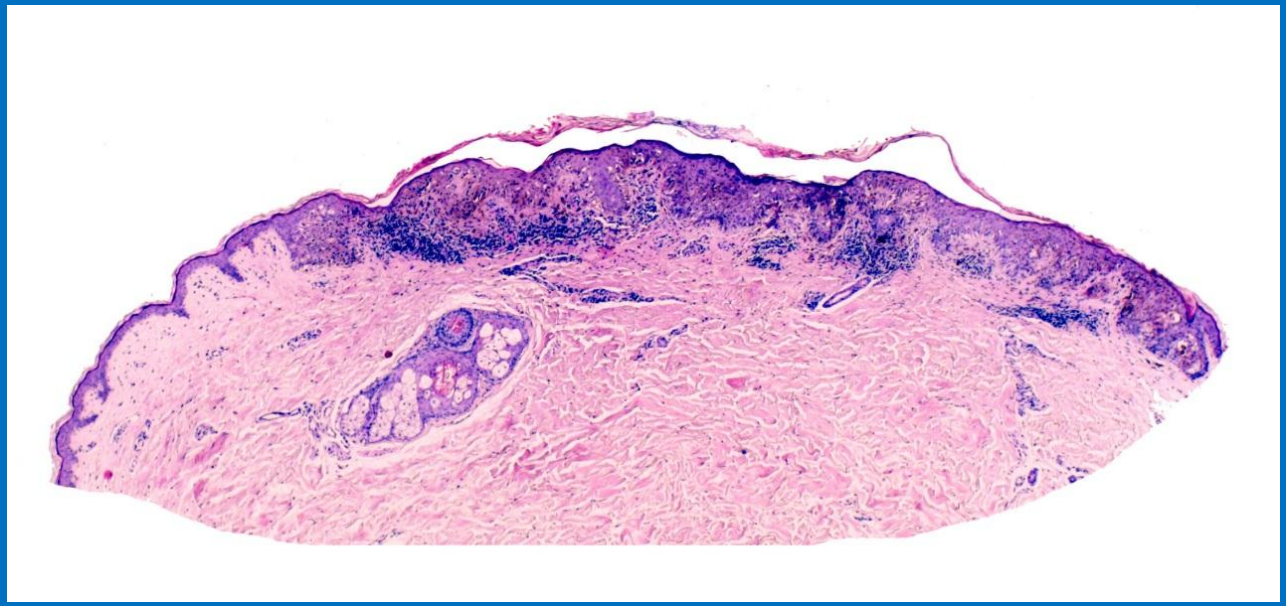


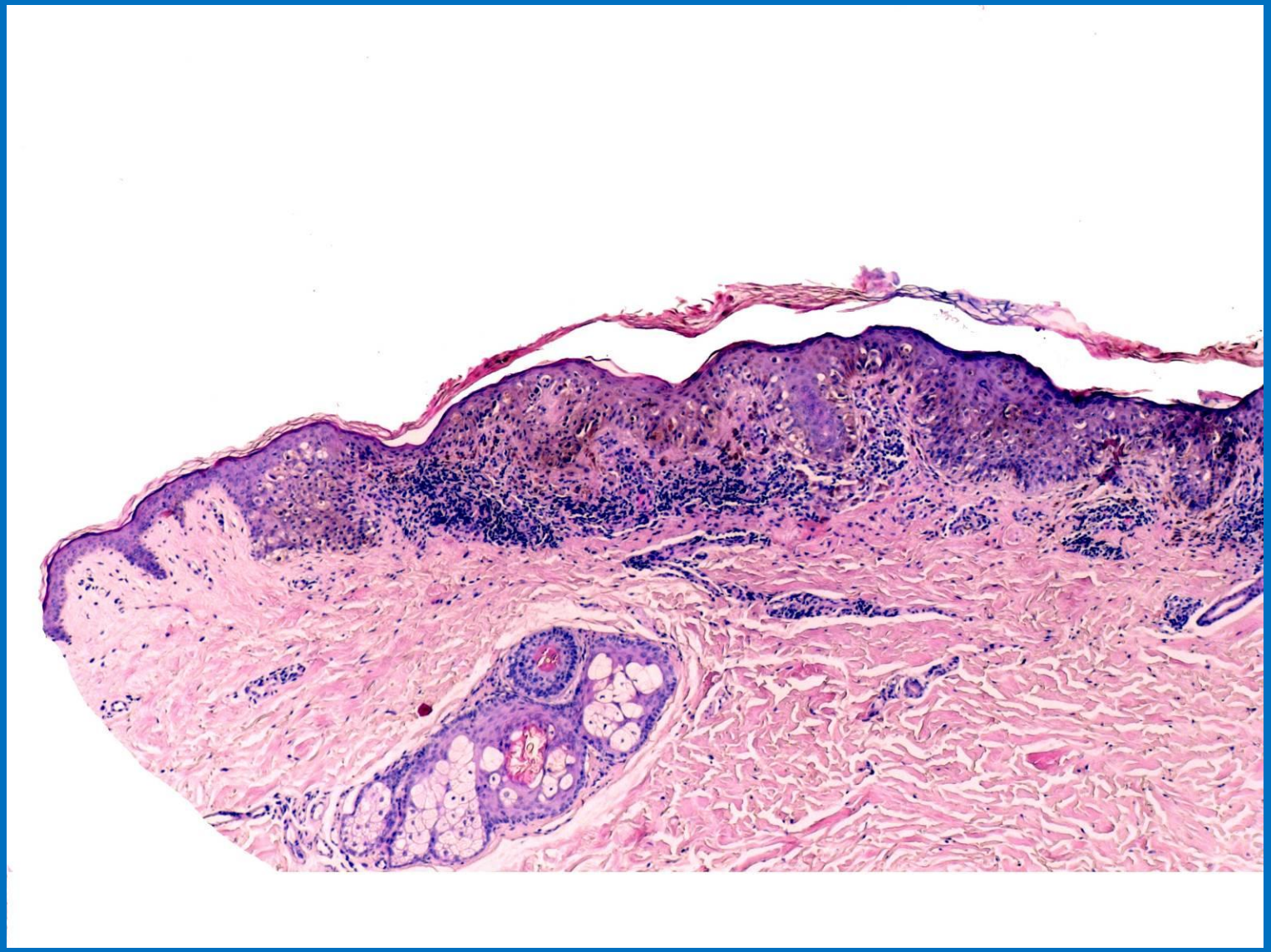


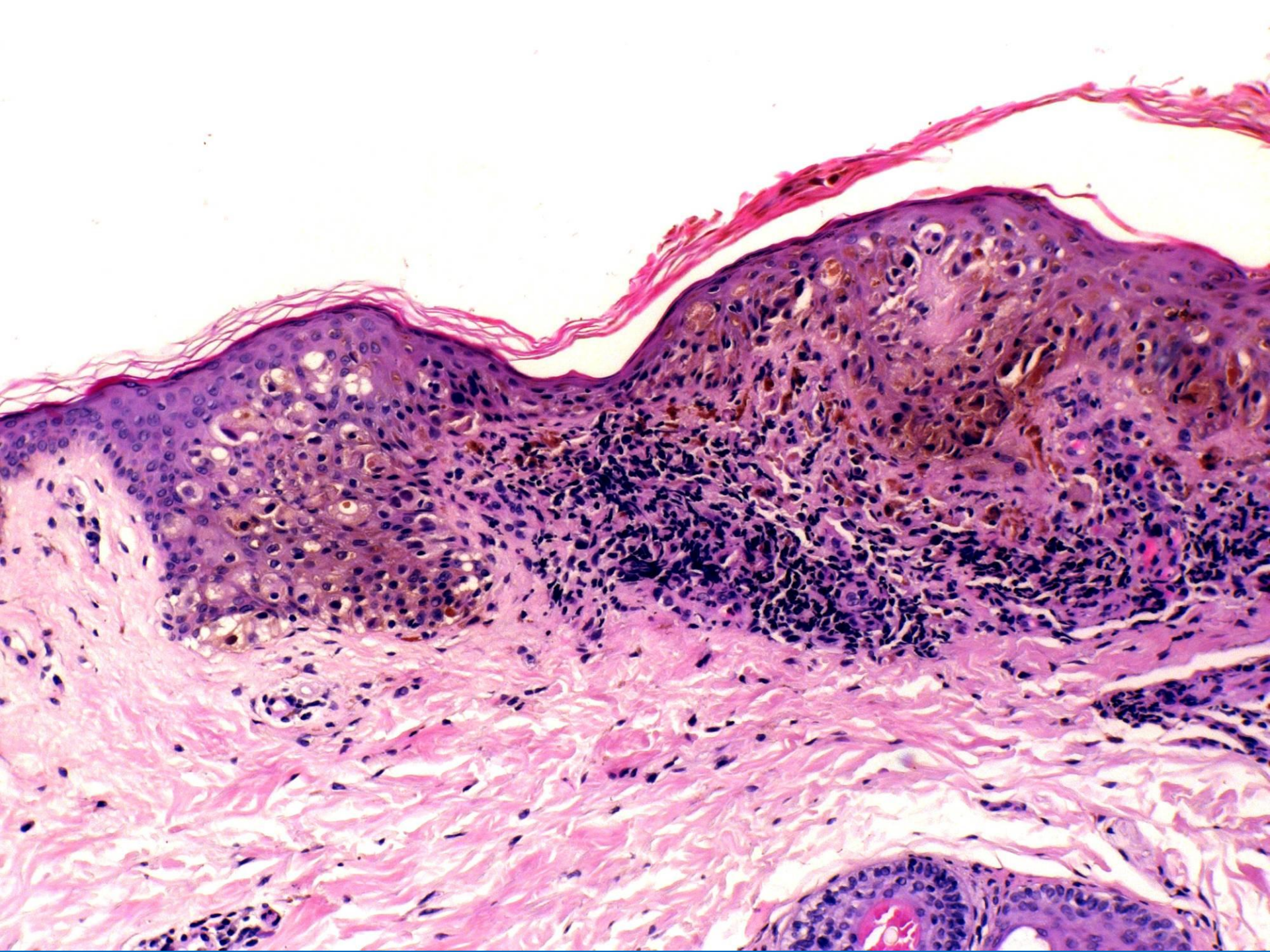












Acknowledging prior work…

- 1987 – Pehamburger – Classic Pattern Analysis
- 1994 – Stolz – ABCD rule
- 1996 – Menzies' method
- 1998 – Argenziano – 7 point checklist
- 2000 – Soyer/Argenziano – 3 point checklist
- 2007 – CASH (color, architecture, symmetry, and homogeneity) version of pattern Analysis

Asymmetry is a clue to malignancy in preceding methods. We did not invent it. We called it "chaos", we defined it (asymmetry of structure and/or colour) and we removed mathematical calculations so it would work in real practice.

Acknowledging prior work…

The Beauty and the Beast Sign in Dermoscopy

Ashfaq A. Marghoob, MD,* Adam J. Korzenko, MD,† Lily Changchien, JD,* Alon Scope, MD,* Ralph P. Braun, MD,‡ and Harold Rabinovitz, MD§

Familiarity with the dermoscopic patterns typically exhibited by benign nevi may provide a framework for determining whether a particular lesion is a "beauty" or a "beast." Hofmann-Wellenhof and co-workers[6] introduced a dermoscopic classification of acquired melanocytic nevi according to predominant dermoscopic pattern and pigmentation. Additional research and experience has confirmed that benign nevi follow nine patterns in particular (Figure 1). Not surprisingly, these patterns all fit the definition of beauty and demonstrate symmetry of pattern, structure, and color.[6–9] Furthermore, experience has

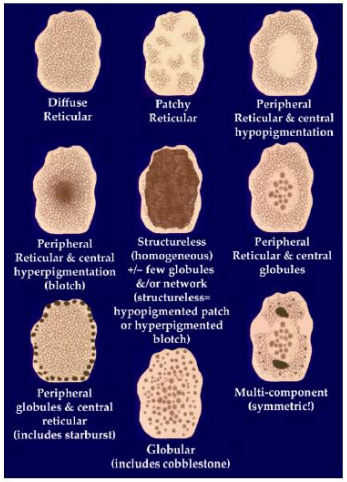


Figure 1. Nine benign patterns representing "beauty." Experience has shown that one rarely, if ever, v melanoma that mimics one of these benign patterns (i.e., a wolf in sheep's clothing).

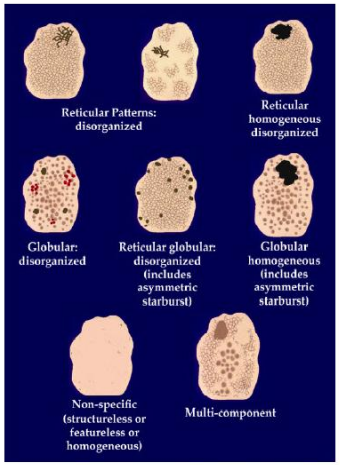


Figure 2. Melanoma ("beast") will deviate from the nine benign patterns and will often reveal one of the eight global dermoscopic patterns shown in the figure, and at least one of eight dermoscopic structures listed in the text. Exceptions, of course, exist: some dysplastic nevi are indistinguishable from the beast (i.e., a sheep in wolf's clothing).

Acknowledging prior work…

A= Asymmetry. Score (0-2)x1.3

B= Border sharpness. Score (0-8)x0.1

C= Colours (light brown, dark brown, black, red, white, blue-grey. Score (1-6)x0.5

D= Dermoscopic structures (Dots, globules, structureless, network, branched streaks. Score (1-5)x0.5

Benign <4.75
Suspicious 4.75-5.45
Malignant >5.45

Major criteria? – 2 points
Minor criteria? – 1 point
> Or = 3 – Melanoma

Melanocytic criteria?
Melanocytic by default?
Not a single colour
Not symmetrical
One of 9 clues?
Special site clues?

CHAOS & CLUES

We built on previous excellent methods. It was a natural evolutionary progression and a lot of the hard work was done by those who developed these seminal methods.

The role of dermatoscopy

Does it improve diagnostic accuracy?

Dermatoscopy —the evidence

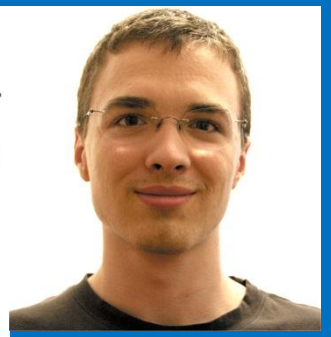
- "...it's use increases diagnostic accuracy between **5% and 30%** over clinical visual inspection, depending on the type of skin lesion and the **experience of the physician**"

Kittler H ,Pehamburger H, Wolff K, Binder M. Diagnostic accuracy of dermoscopy. Lancet Oncol 2002;3(3):159-165

ORIGINAL ARTICLE

Diagnostic accuracy of dermatoscopy for melanocytic and nonmelanocytic pigmented lesions

Cliff Rosendahl, MB BS,[a] Philipp Tschandl, Cand med,[b] Alan Cameron, MB BS,[a] and Harald Kittler, MD[b]
Brisbane, Australia, and Vienna, Austria



Background: It is unknown whether dermatoscopy improves the diagnostic accuracy for all types of pigmented skin lesions or only for those that are melanocytic.

Objective: We sought to assess if the addition of dermatoscopy to clinical examination with the unaided eye improves diagnostic accuracy for all types of pigmented lesions.

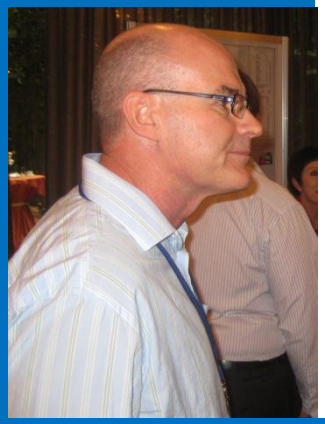
Methods: We analyzed 463 consecutively excised pigmented skin lesions collected during a period of 30 months in a primary care skin cancer practice in Queensland, Australia.

Results: Of 463 lesions, 217 (46.9%) were nonmelanocytic. Overall 30% (n = 138) were malignant including 29 melanomas, 72 basal cell carcinomas, and 37 squamous cell carcinomas. The diagnostic accuracy for malignant neoplasms measured as area under receiver operating characteristic curves was 0.89 with dermatoscopy and 0.83 without it ($P < .001$). Given a fixed specificity of 80%, the corresponding sensitivity was 82.6% with dermatoscopy and 70.5% without it. The improvement achieved by dermatoscopy was higher for nonmelanocytic lesions than for melanocytic lesions. A short algorithm based on pattern analysis reached a sensitivity of 98.6% for basal cell carcinoma, 86.5% for pigmented squamous cell carcinoma, and 79.3% for melanoma. Among benign conditions, the highest false-positive rate (90.5%) was observed for lichen planus–like keratosis.

Limitations: Estimates of diagnostic accuracy are influenced by verification bias.

Conclusions: Dermatoscopy improves the diagnostic accuracy for nonmelanocytic lesions. A simple algorithm based on pattern analysis is suitable for the detection of melanoma and nonmelanoma skin cancer. (J Am Acad Dermatol 10.1016/j.jaad.2010.03.039.)

Key words: basal cell carcinoma; dermatoscopy; melanocytic nevi; melanoma; nonmelanoma skin cancer; pigmented skin lesions; squamous cell carcinoma.



This was the first study to show that dermatoscopy improved diagnostic accuracy for non-melanocytic pigmented lesions as well as for melanocytic ones.

[2]

Whether dermatoscopy Improves diagnostic accuracy depends on the lesions in the test series. For lesions like this on the right-hand side of the melanoma time-line it does not improve diagnostic accuracy over naked-eye examination.

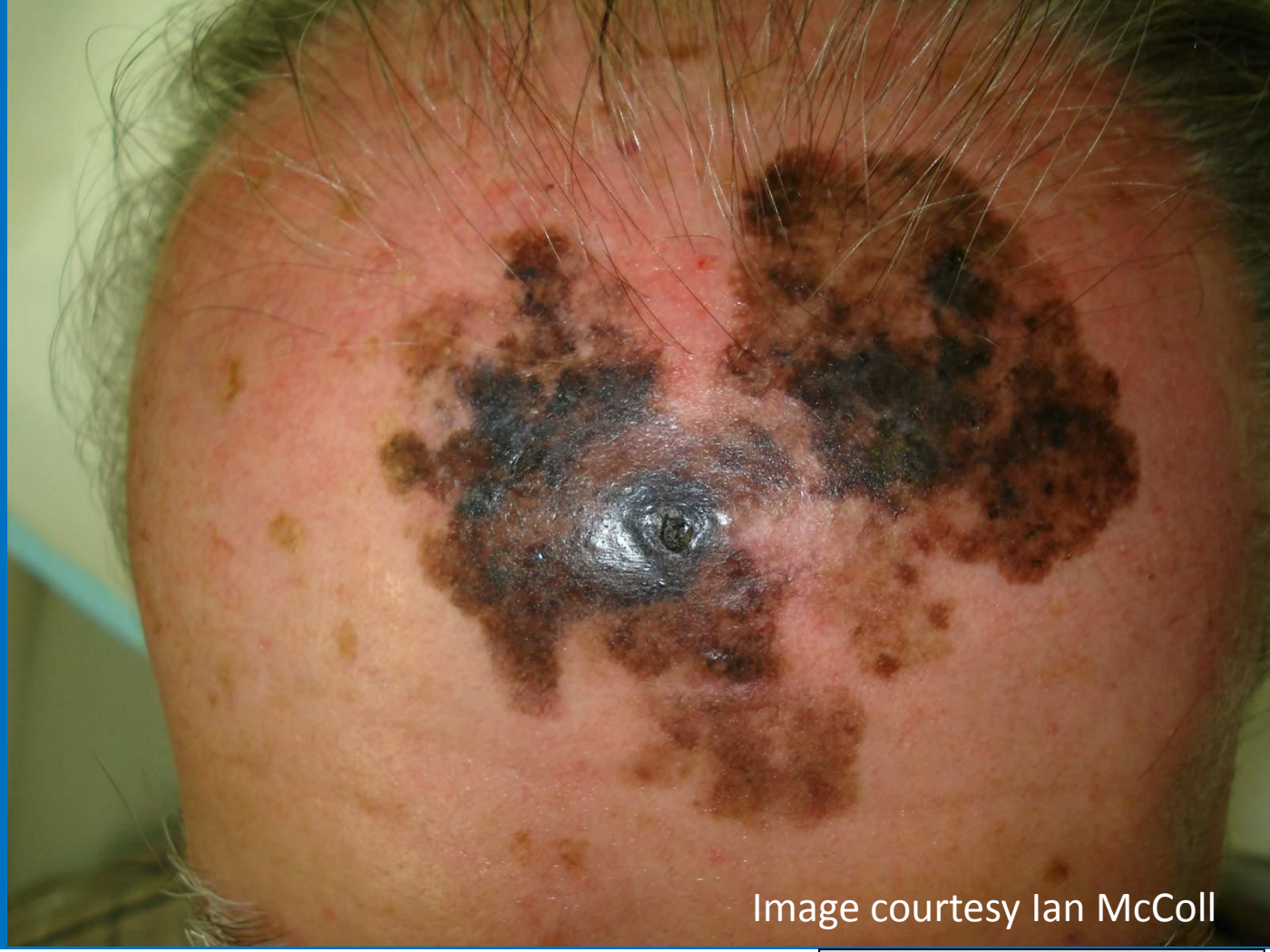
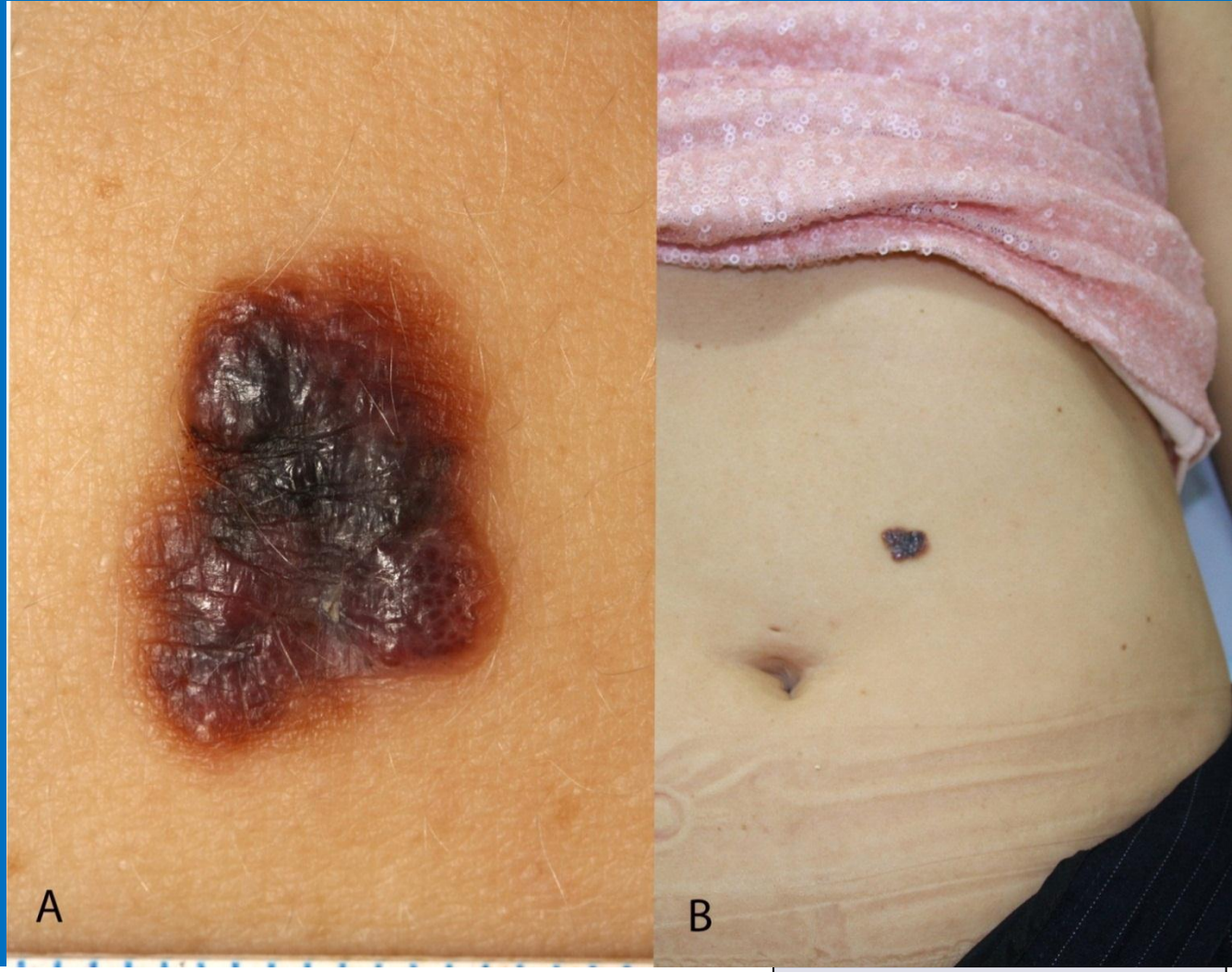
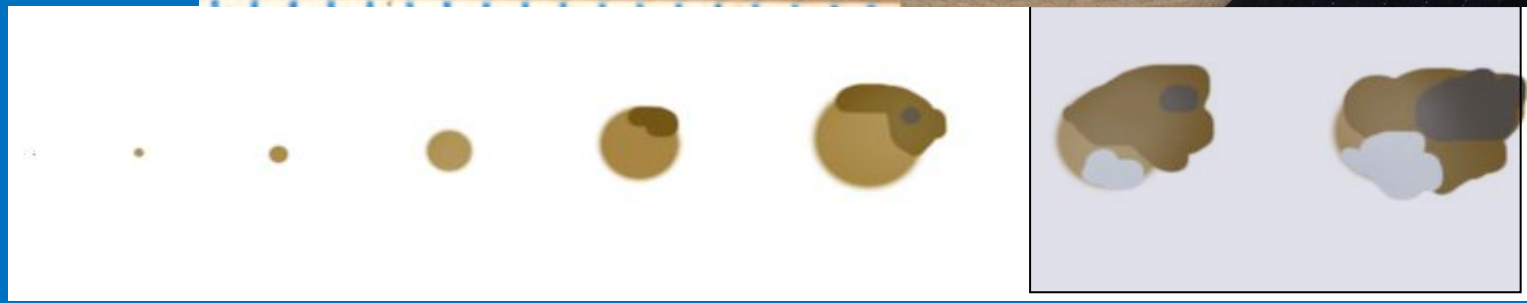


Image courtesy Ian McColl

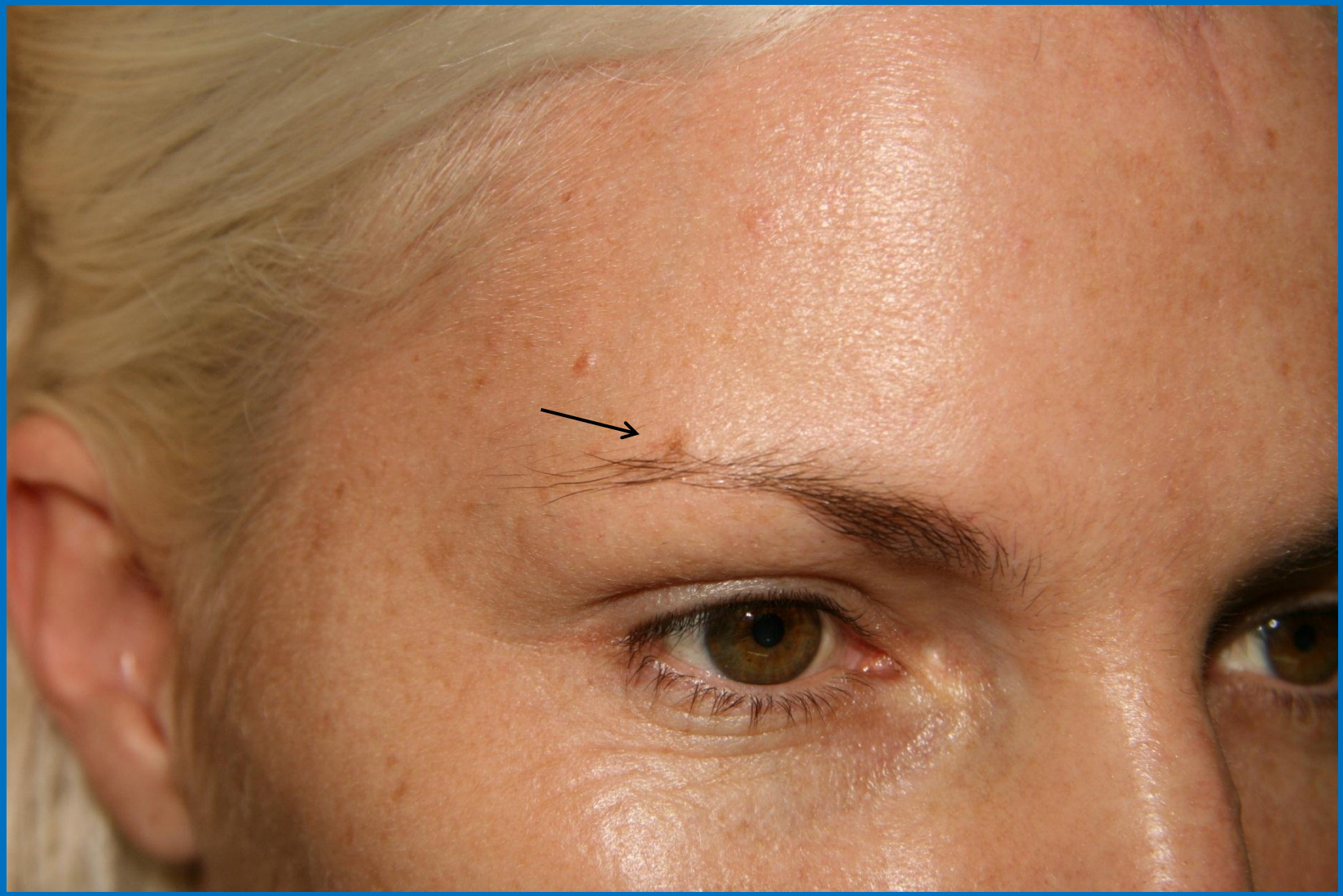
Melanoma time-line

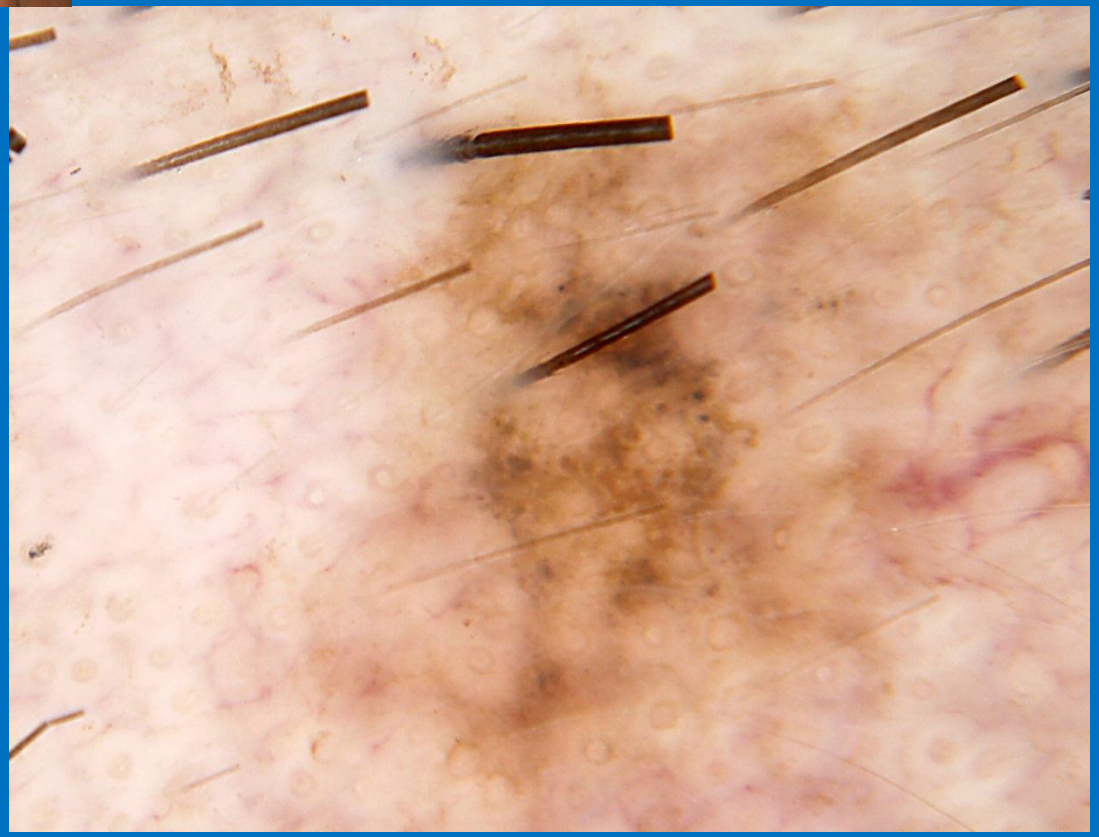
Whether dermatoscopy Improves diagnostic accuracy depends on the lesions in the test series. For lesions like this on the right-hand side of the melanoma time-line it does not improve diagnostic accuracy over naked-eye examination.

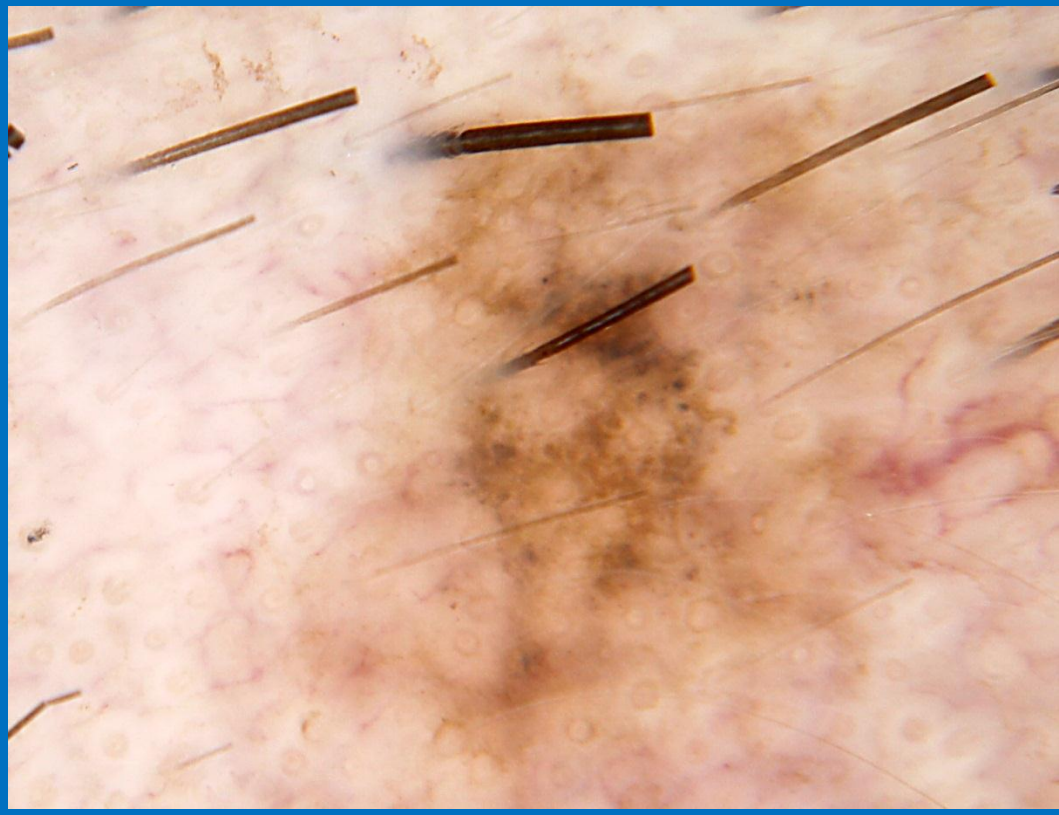




Melanoma time-line



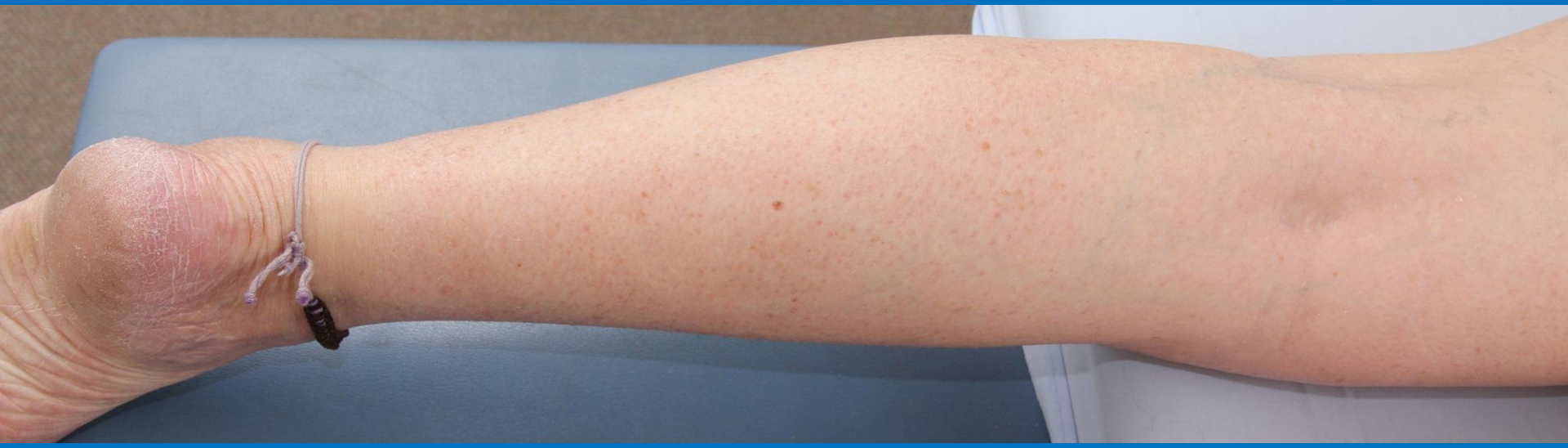


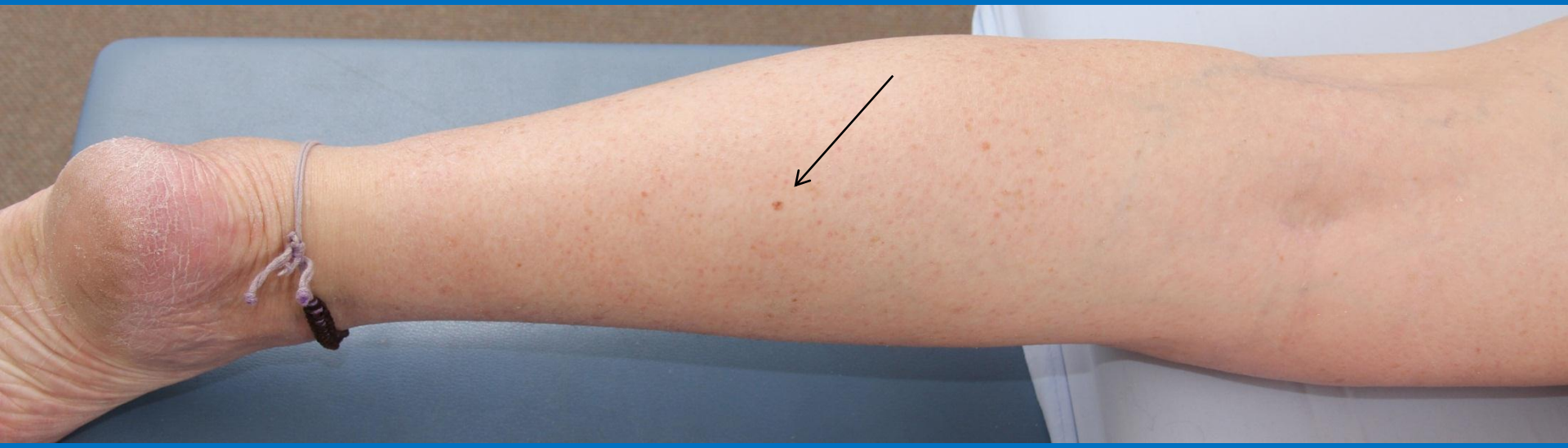


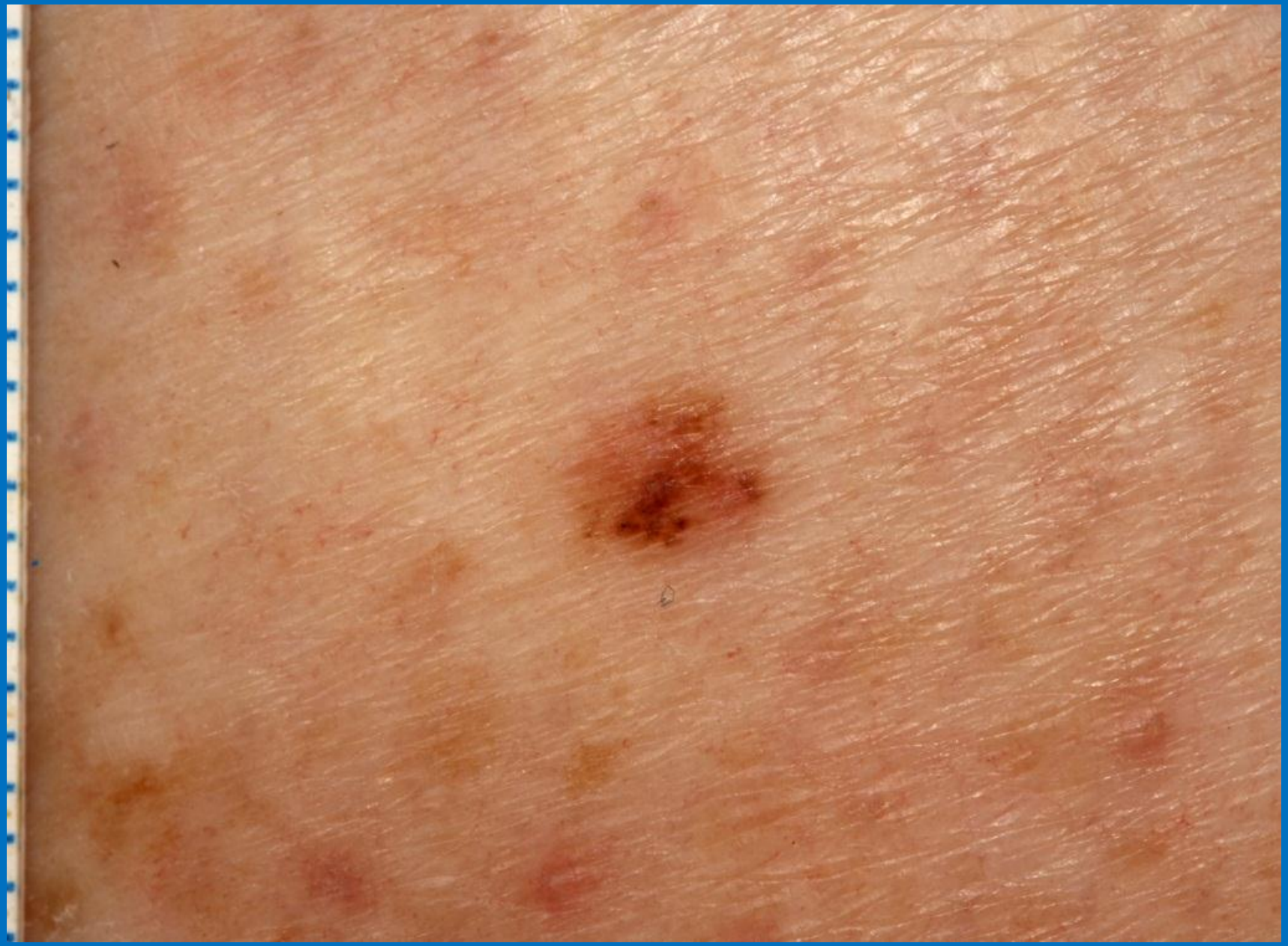
For lesions in the centre of the melanoma time-line dermatoscopy improves diagnostic accuracy over naked eye examination. For small lesions like this the risk is that the dermatoscope will not be used. Fortunately, after the examination during which this lesion was ***not*** examined, the patient was asked if she was aware of anything new. She pointed to this lesion. It was a lentigo maligna. (Patient permitted this image to be used)

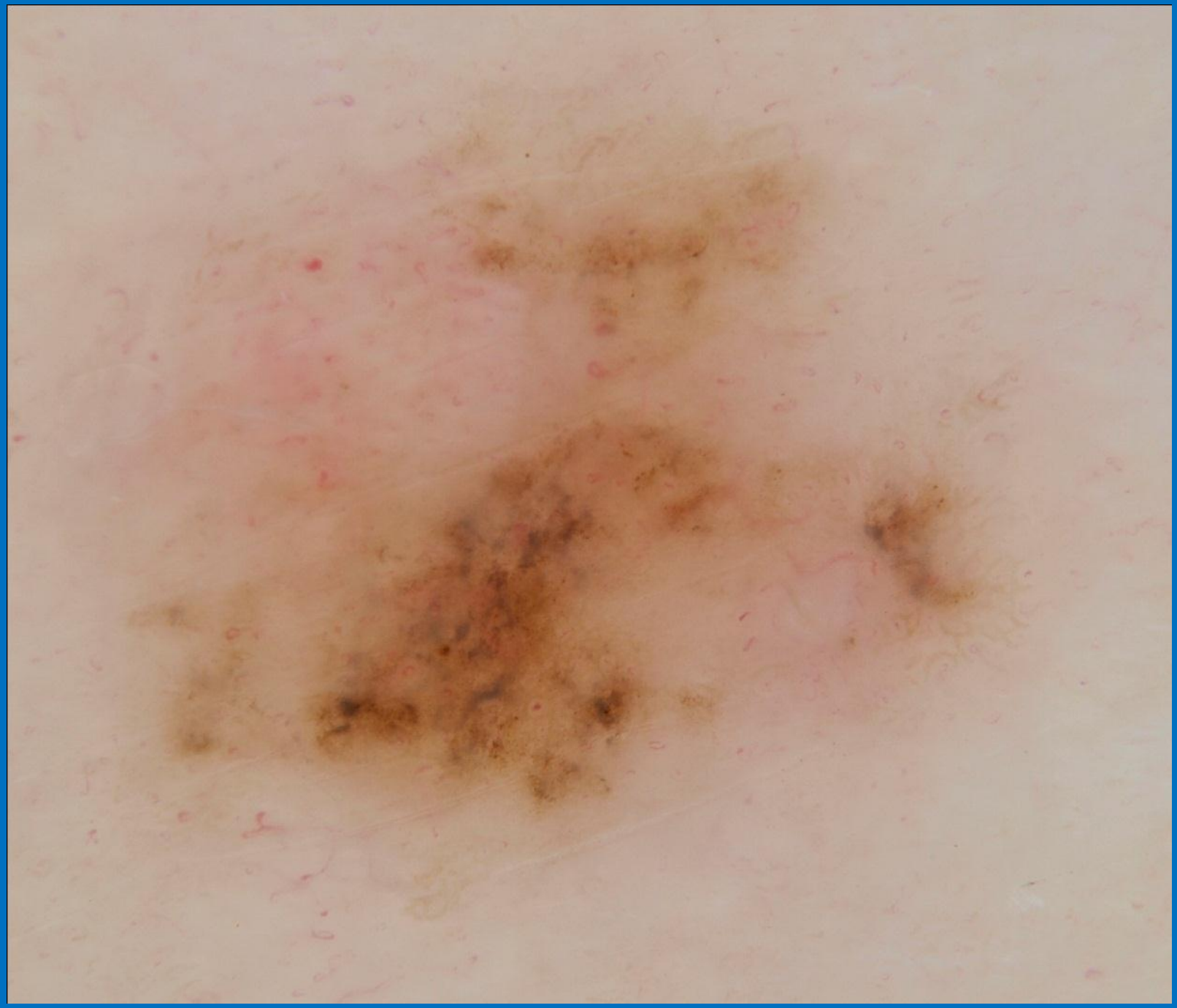
An acquired flat pigmented shin lesion on the face may be a solar lentigo/seborrhoeic keratosis, pigmented BCC, pigmented SCC in-situ or a melanoma. While dermal naevi and congenital naevi occur on the face, Clark (or so-called dysplastic) naevi are not expected.

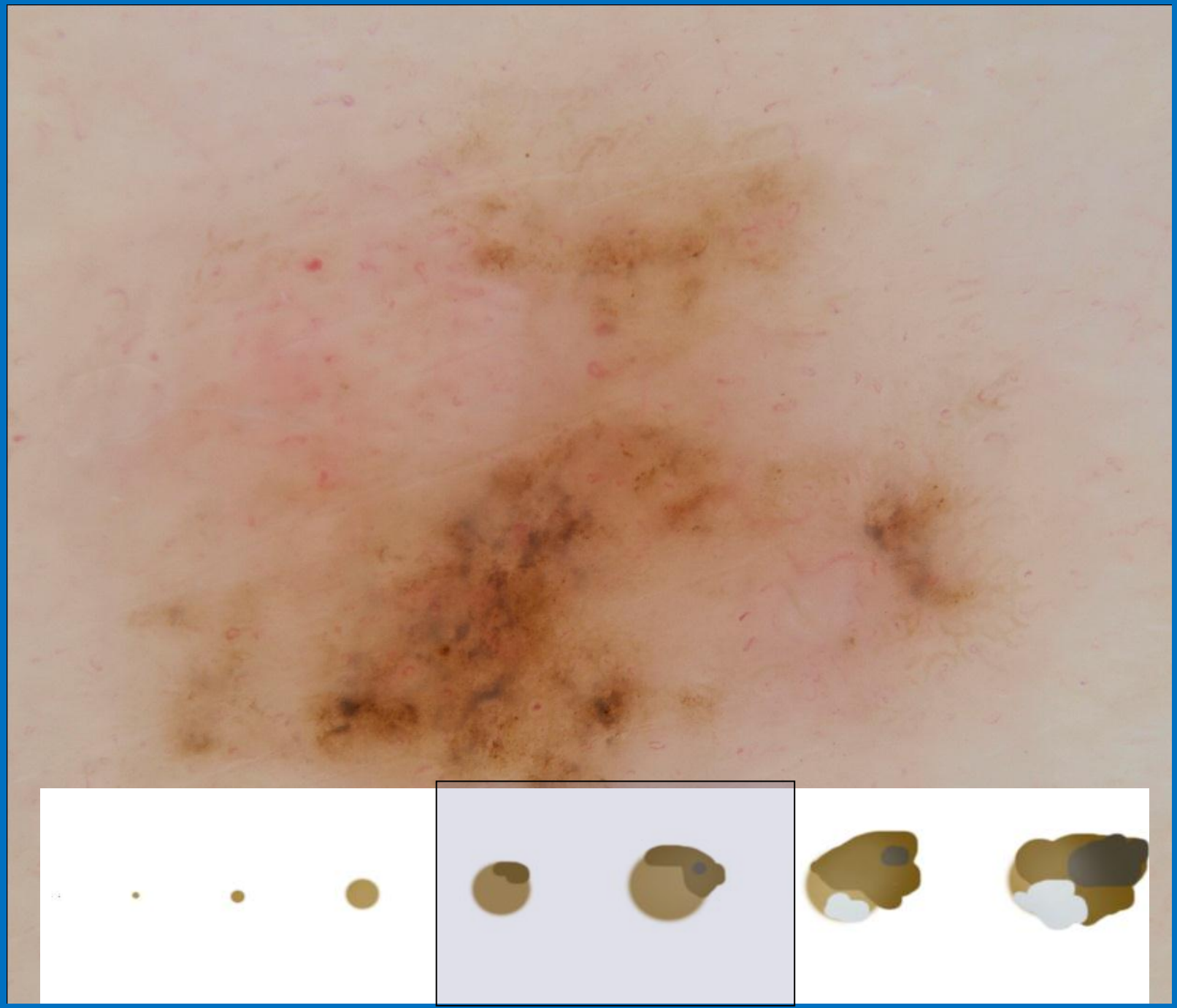
If a naevus on the face is reported as "Clark naevus" or "dysplastic naevus" consider requesting a further assessment or opinion.

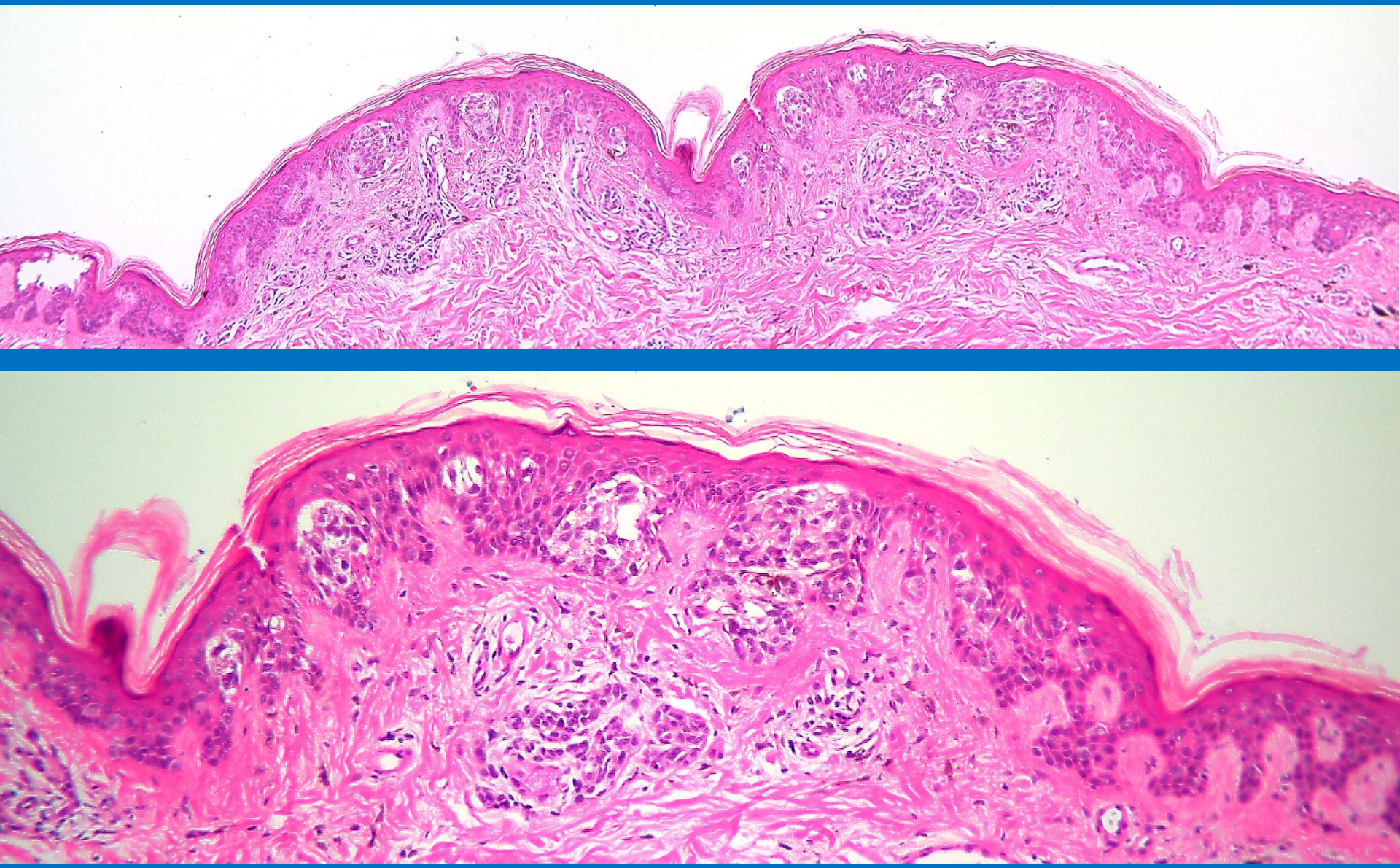


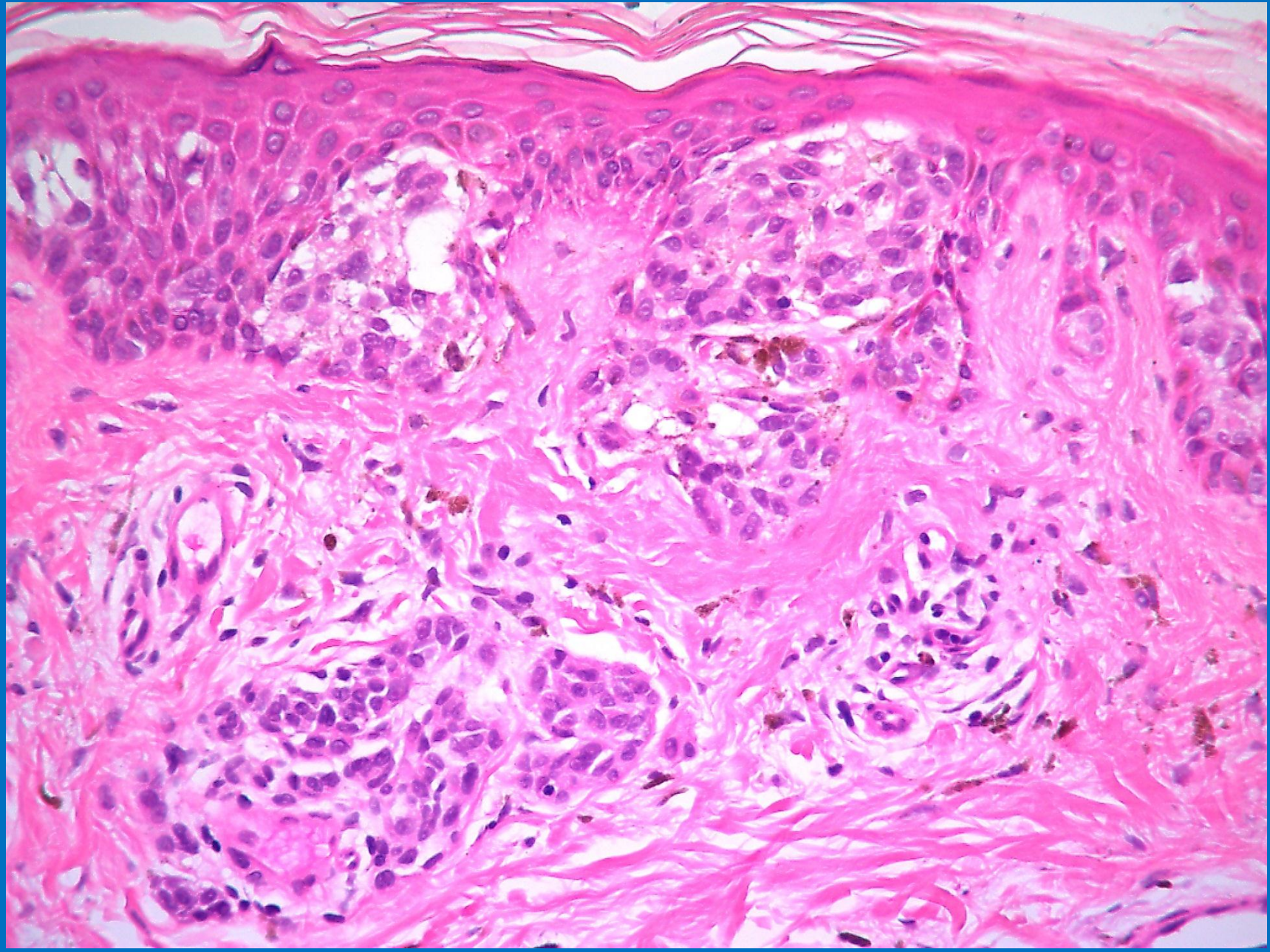




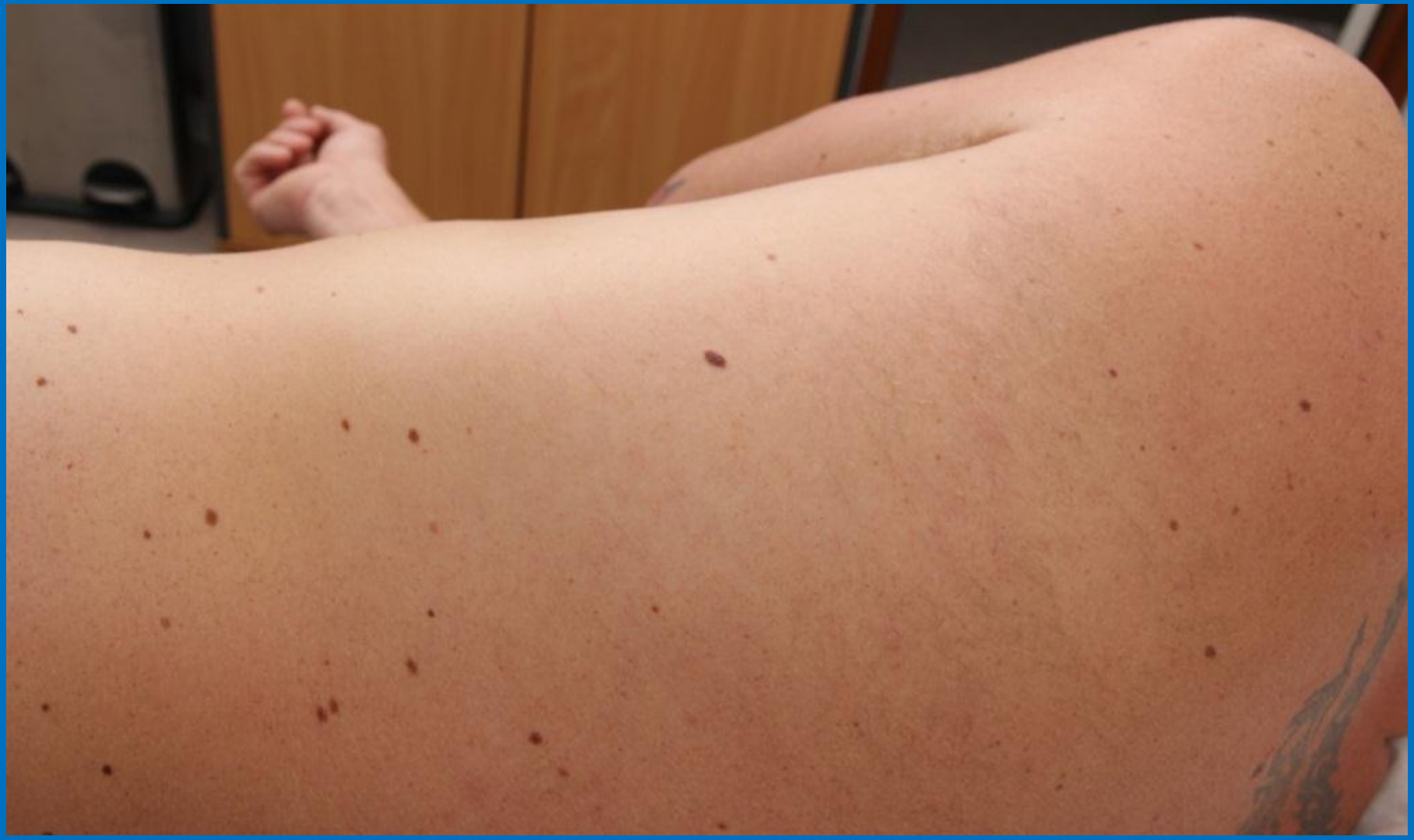


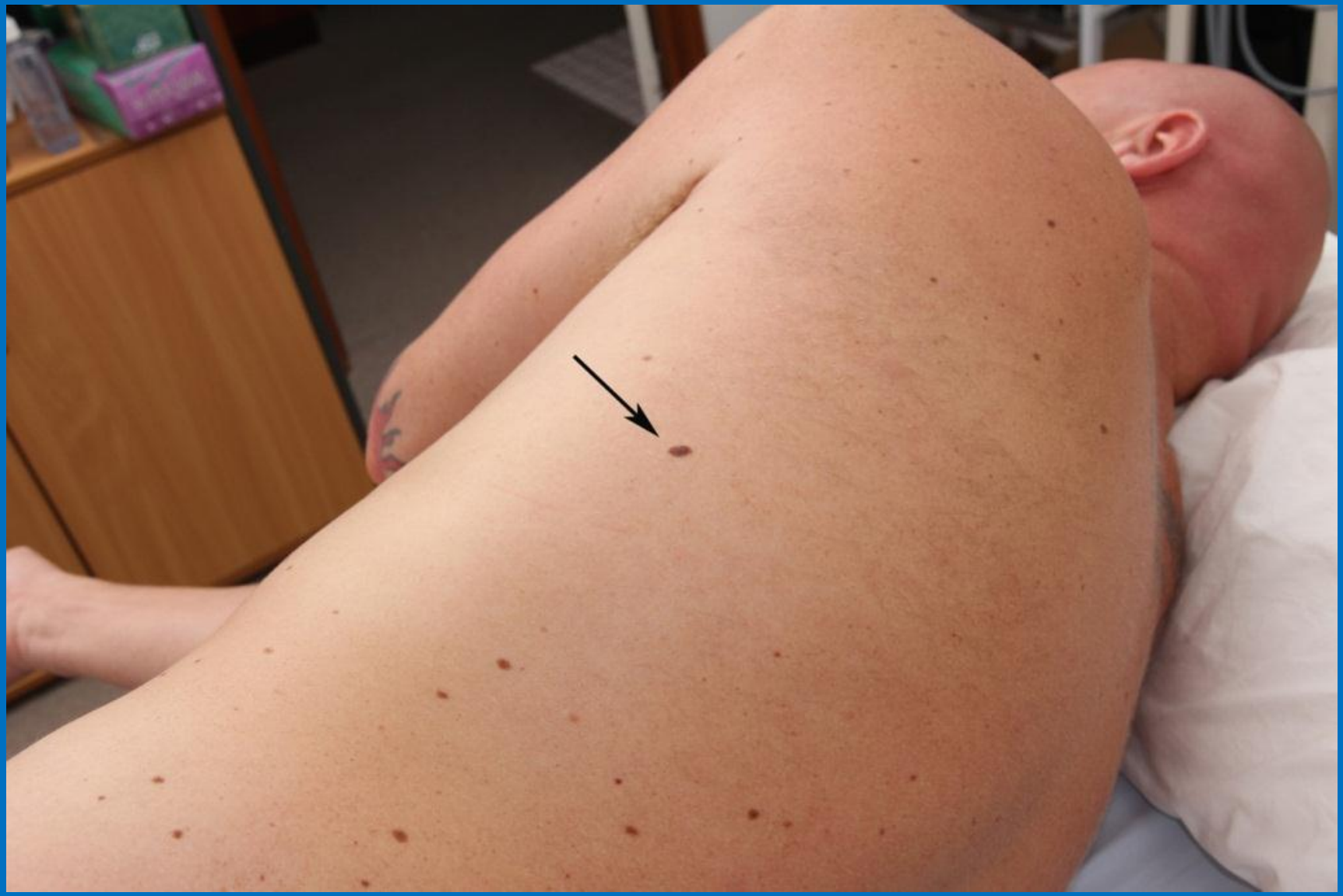


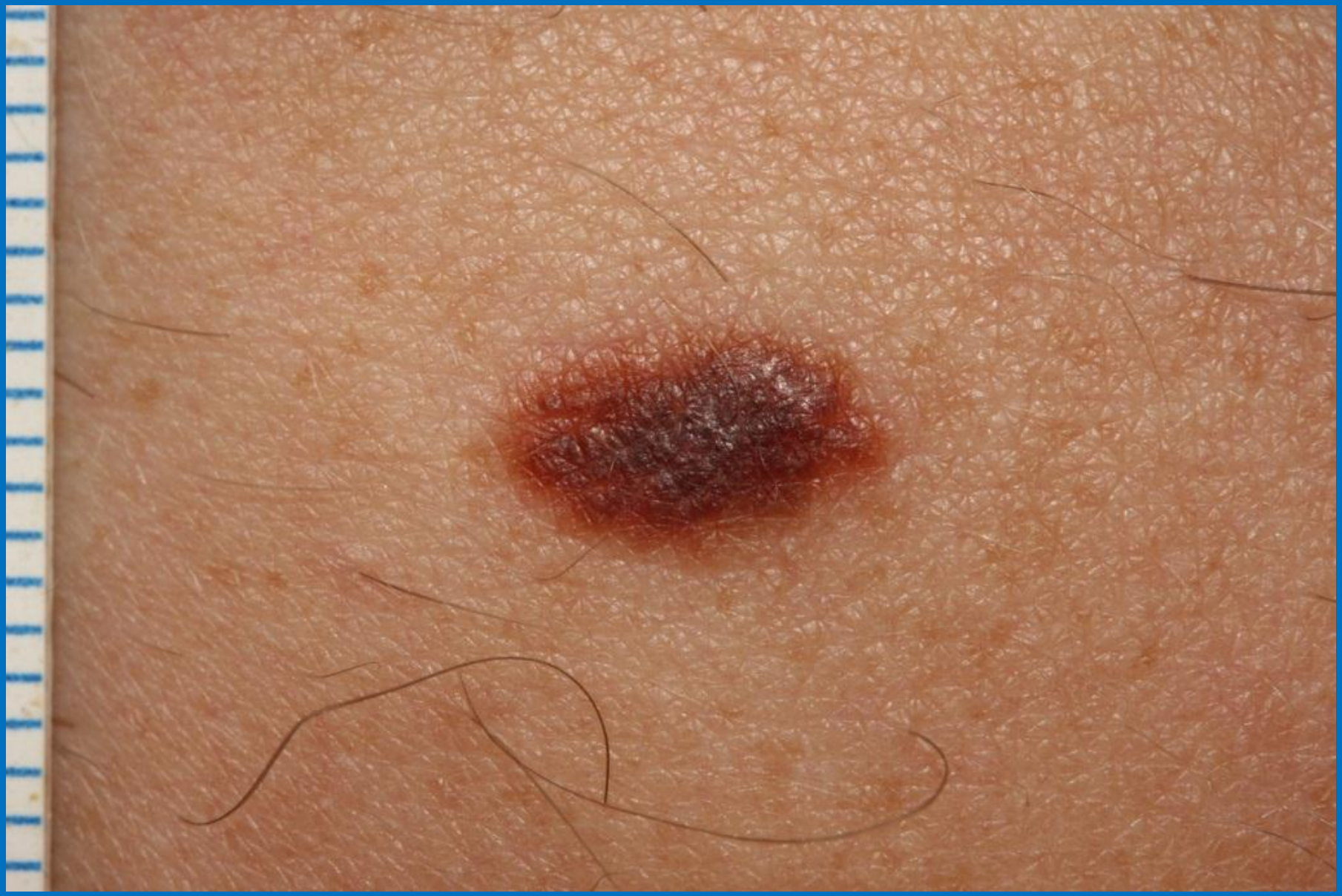


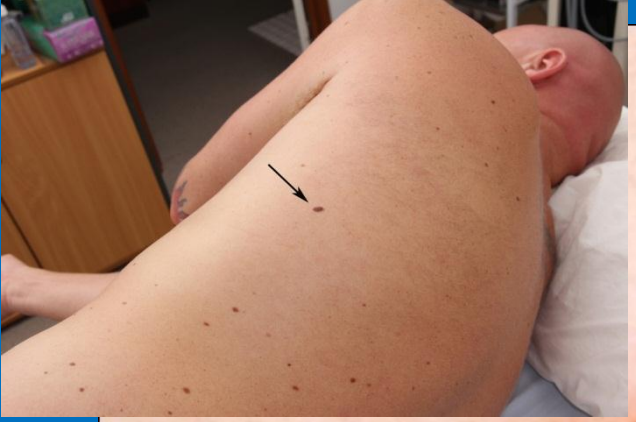


Invasive melanoma

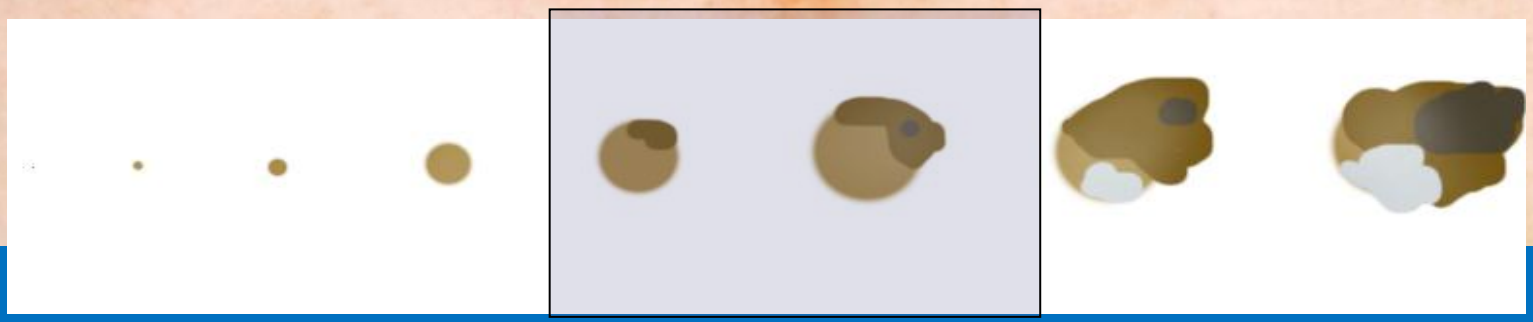


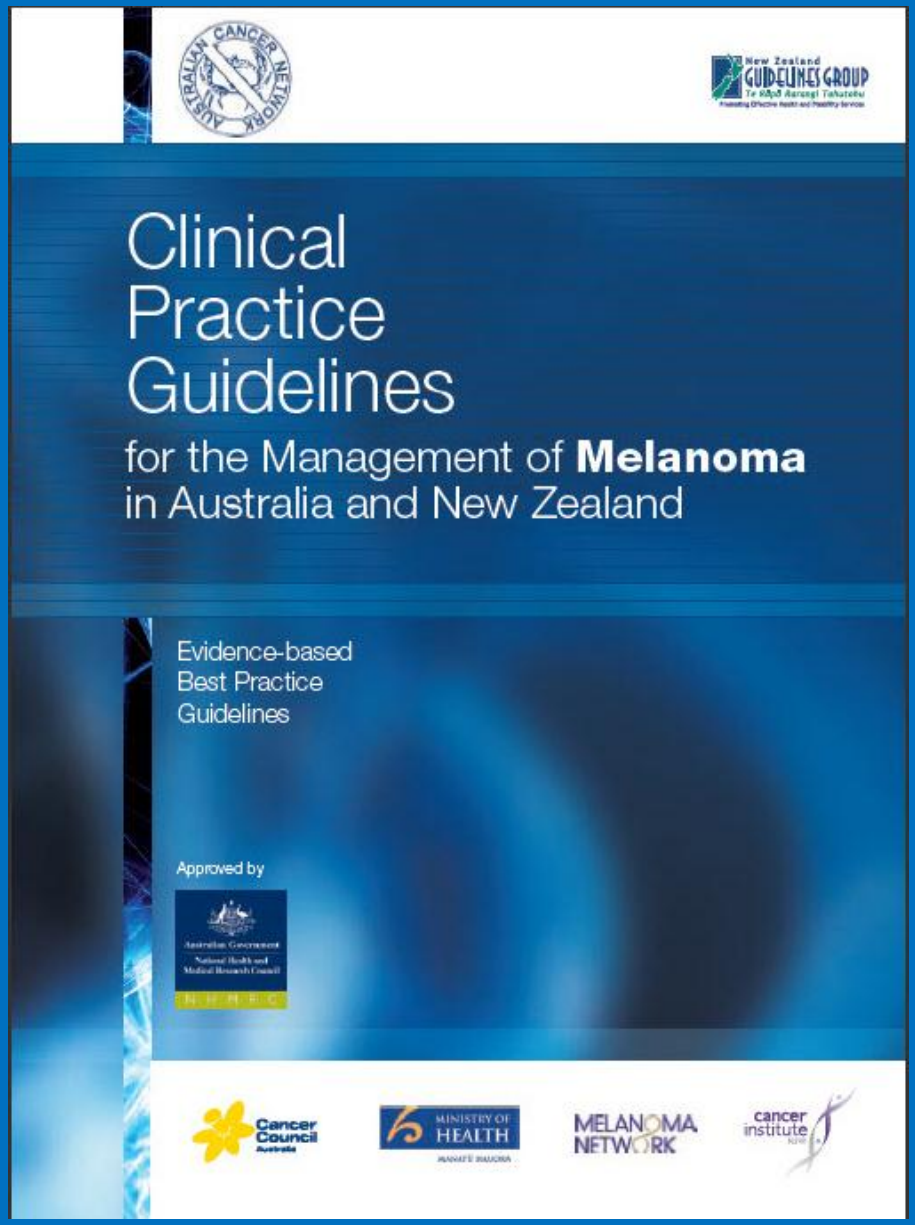






Invasive melanoma




AUSTRALIAN CANCER NETWORK
New Zealand GUIDELINES GROUP
Clinical Practice Guidelines
for the Management of Melanoma in Australia and New Zealand
Evidence-based Best Practice Guidelines
Approved by
Australian Government National Health and Medical Research Council
NHMRC
Cancer Council Australia
MINISTRY OF HEALTH
MELANOMA NETWORK
cancer institute NSW

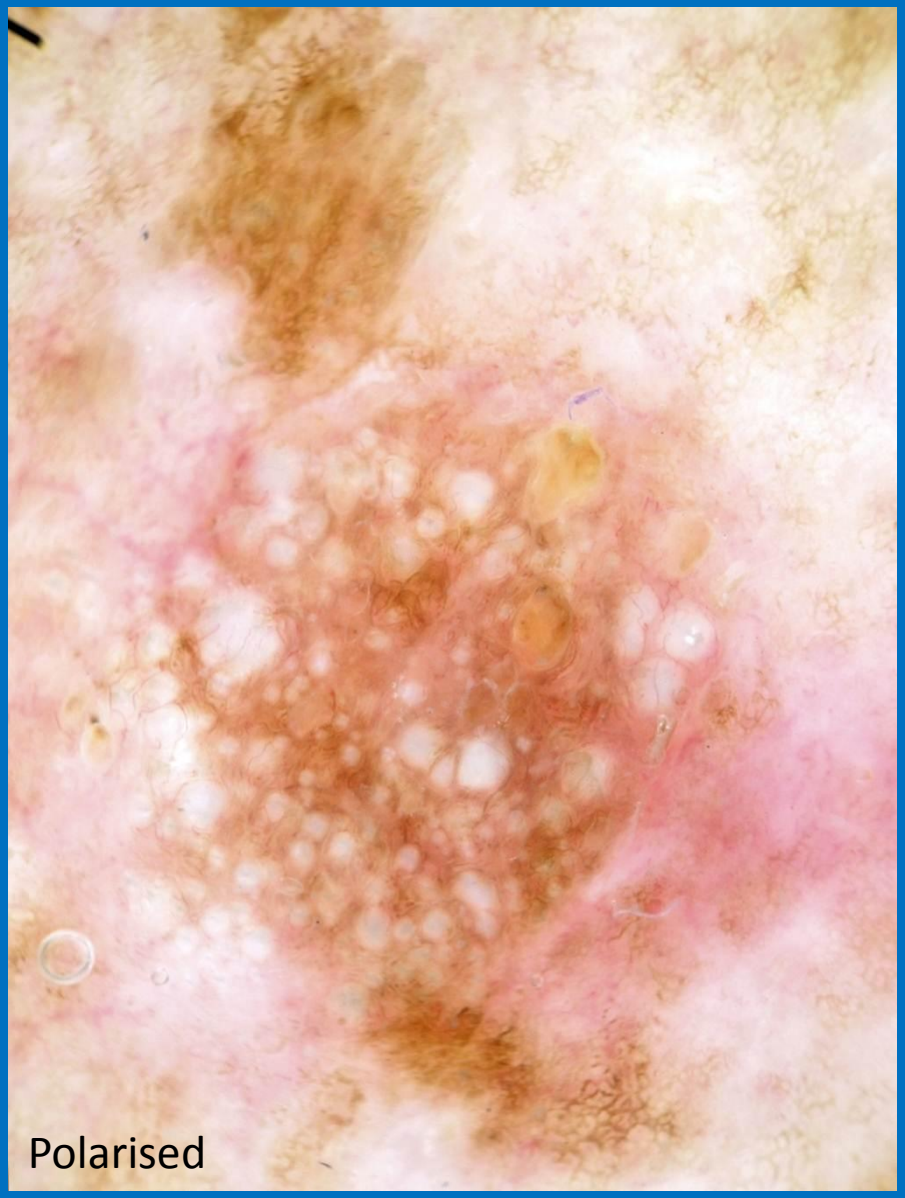
5	Clinical diagnosis	
	1. Training and utilisation of dermoscopy is recommended for clinicians routinely examining pigmented skin lesions	A
	2. Consider the use of sequential digital dermoscopy imaging to detect melanomas that lack dermoscopic features of melanoma	B
	3. Consider the use of baseline total body photography as a tool for the early detection of melanoma in patients who are at high risk for developing primary melanoma	C
	Good practice points • Examination for melanoma detection requires examination of the whole skin surface under good lighting • A careful clinical history of specific changes in the lesion, any symptoms and their time course is critically important in assessing whether a lesion may be melanoma, particularly for melanomas that have absent or unusual clinical features for melanoma • Where there is a low index of suspicion for early, non-invasive melanoma a short period of observation aided by measurement, a clinical photo or dermoscopic imaging may be appropriate • All patients seeking advice about pigmented lesions be encouraged to regularly check their skin with the aid of a mirror or a partner and advised about the changes to look for in early melanoma	

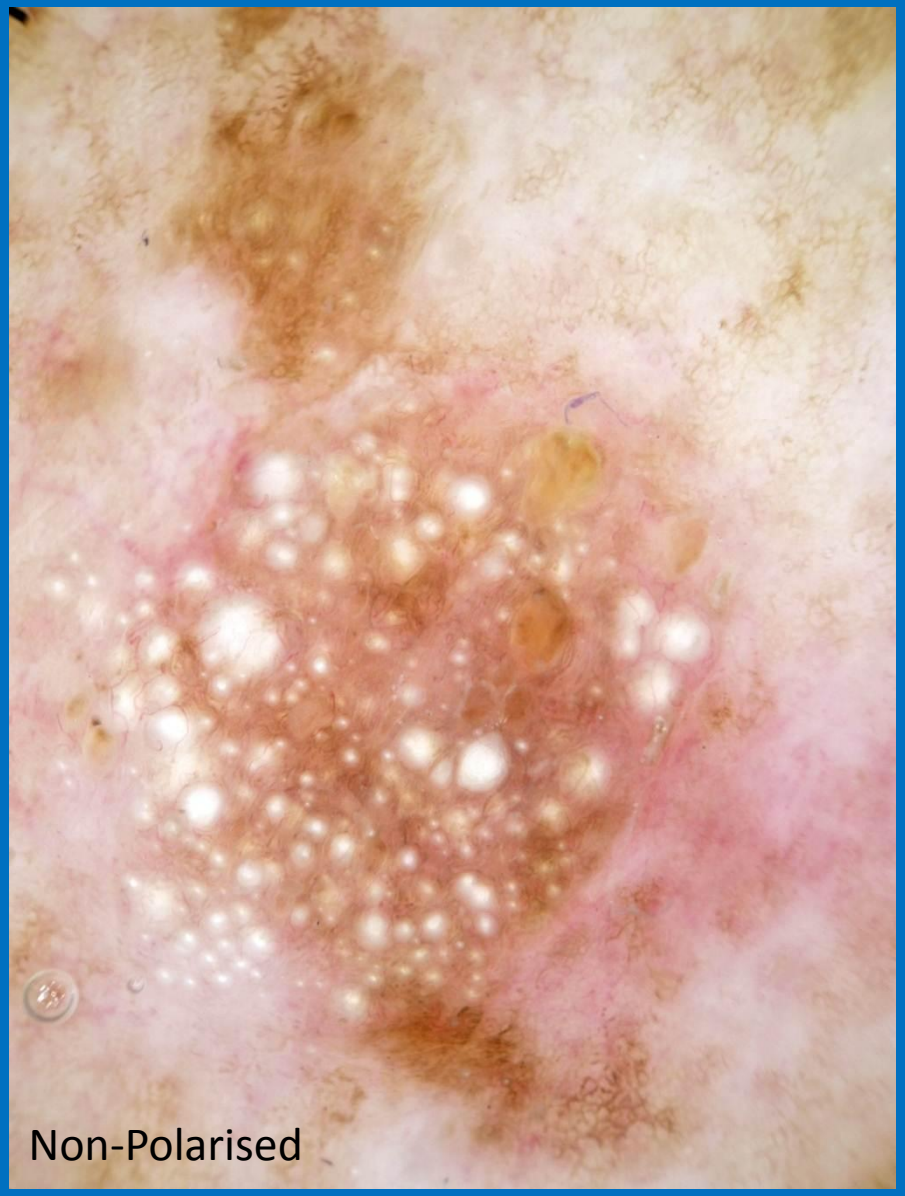
Grading of recommendations

Grade	Description
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution

The indispensability if the dermatoscope to clinicians treating skin cancer is as fundamental as the use of the stethoscope to physicians in general.

Polarised vs Non-Polarised





Photographs Alan Cameron

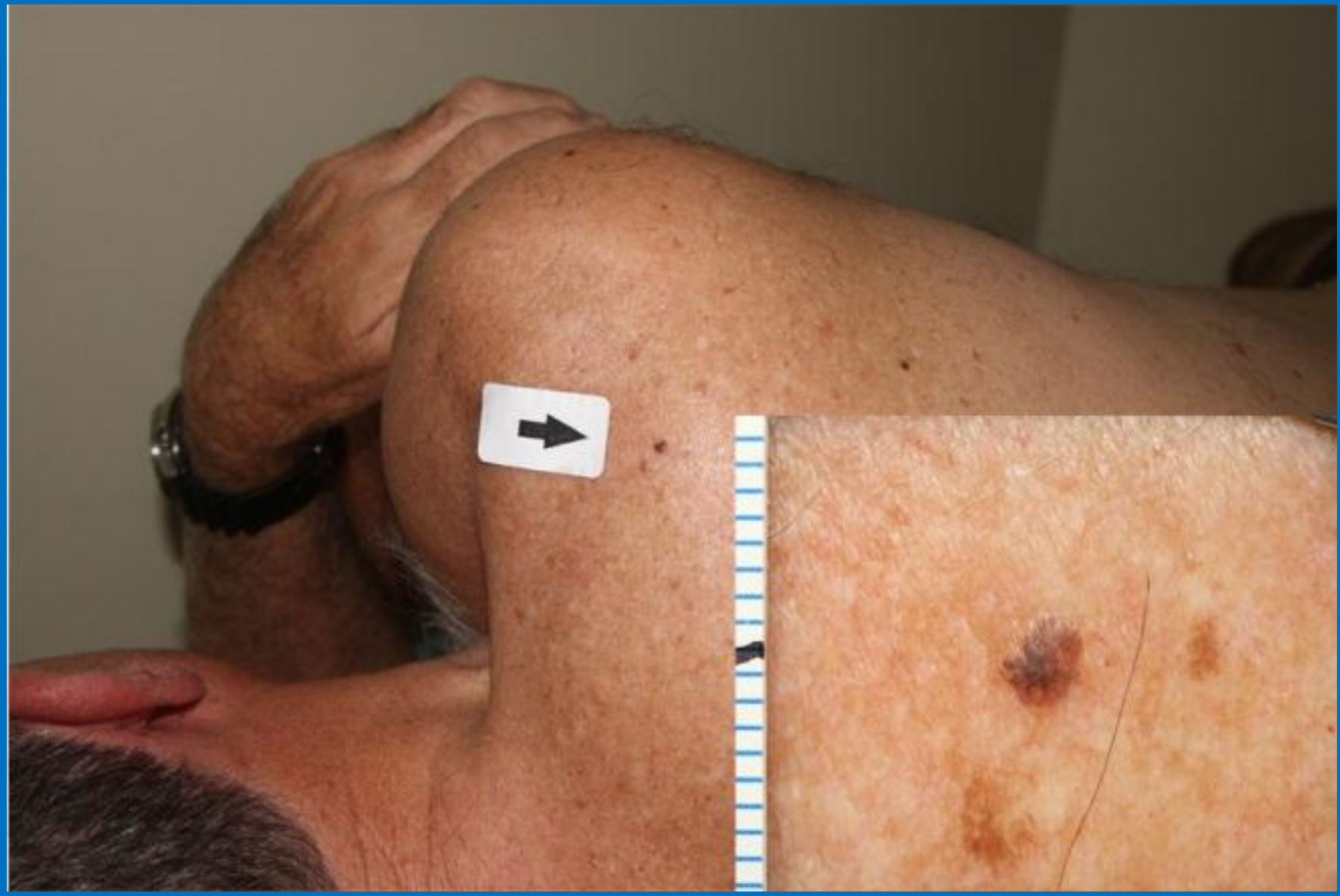
White clods (milia-like cysts) are more clearly seen with non-polarised dermatoscopy as demonstrated in this seborrhoeic keratosis

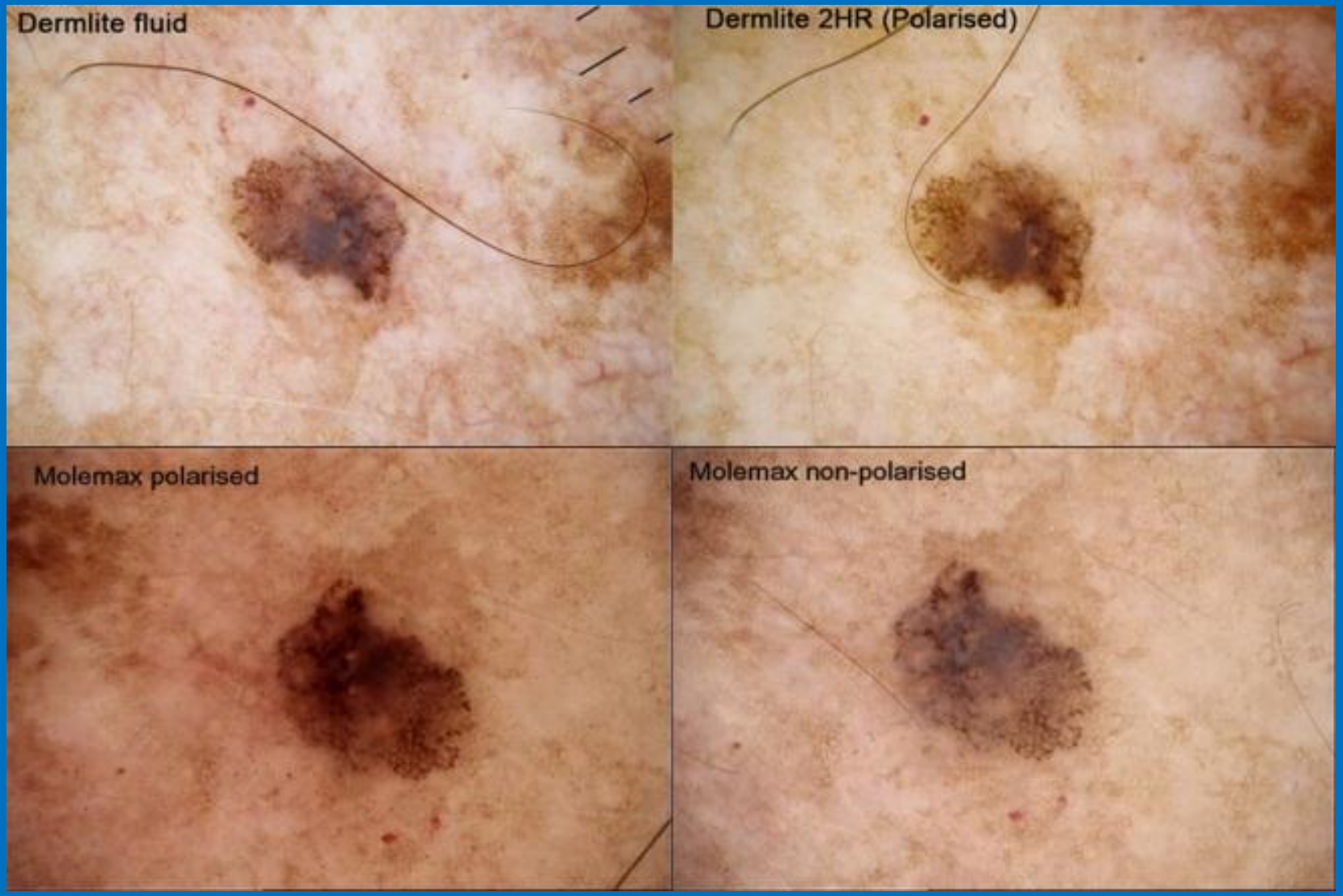
Dermlite DL3 Polarised

Dermlite DL3 Non-polarised

Polarising –specific white lines (chrysalis structures) in a raised lesion can be seen in melanoma, Spitz naevus, BCC and dermatofibroma. In an asymmetric lesion which is not a BCC the diagnosis of invasive melanoma (as in this case) is likely.

4-dot clods (rosettes) in a pigmented actinic keratosis. Be aware that this structure can be seen on any sun-damaged skin, including on a melanoma.





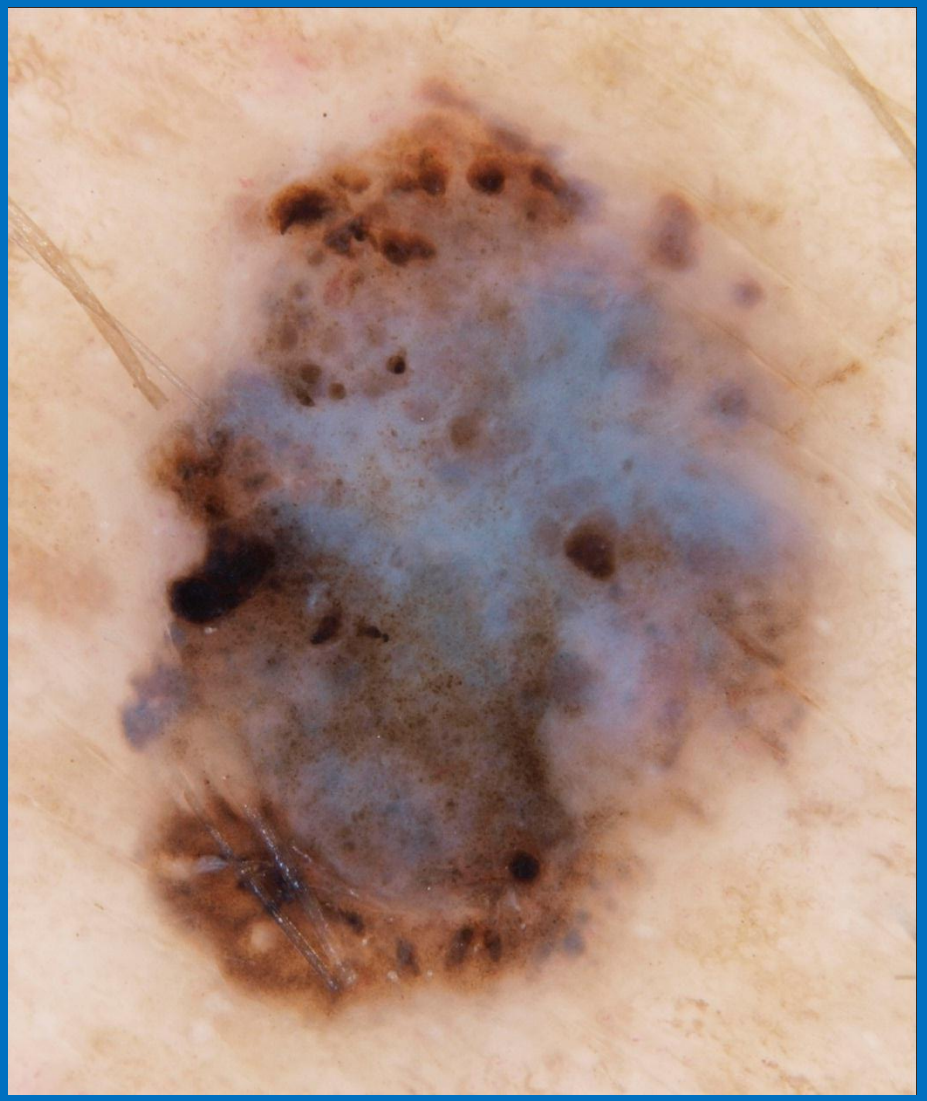
Different dermatoscopes render some colours (especially blue and grey) differently. It is important to understand the strengths and limitations of the device used. Ideally both polarised and non-polarised dermatoscopy should be used.

Understanding colours in Dermatoscopy

The Tyndall Effect

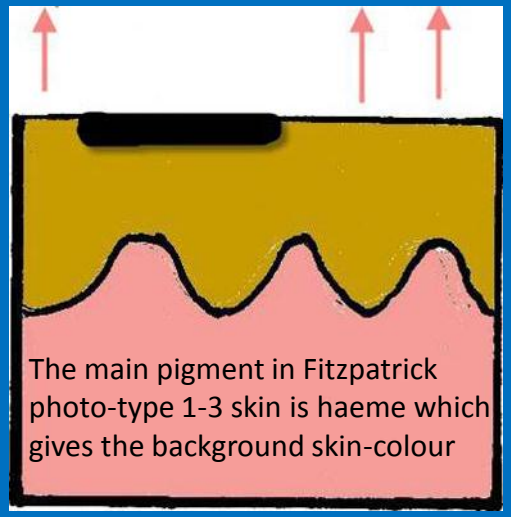
Why is the sky blue?

Particles in a colloid solution scatter light and they scatter short wave-length (blue) light about 16 times more than long wave-length (red) light.

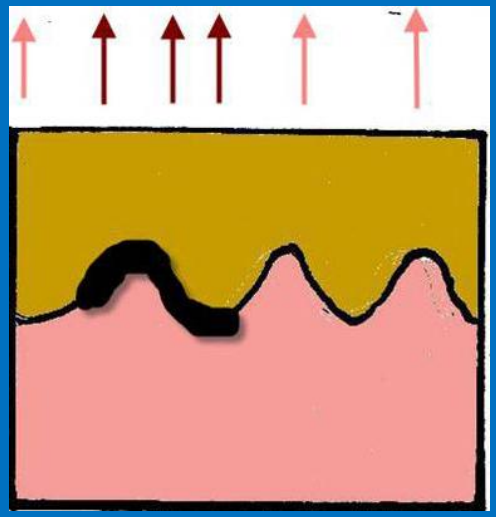


Particles in the atmosphere act as a colloid solution therefore in daylight the sky on earth is blue, while on the moon it is black. Collagen fibrils in the dermis scatter light in a similar way so melanin in the dermis appears grey or blue.

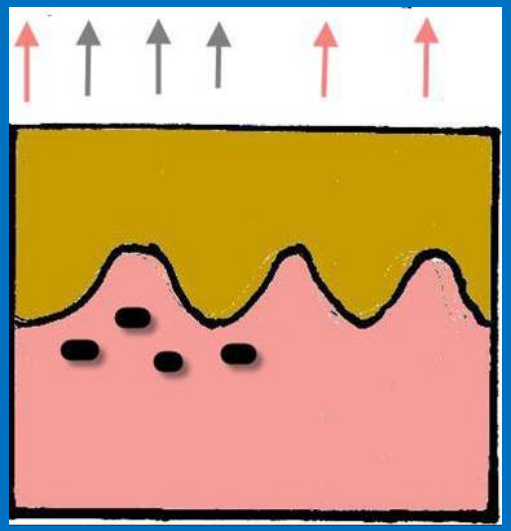
Images on left courtesy NASA modified in photoshop by Cliff Rosendahl



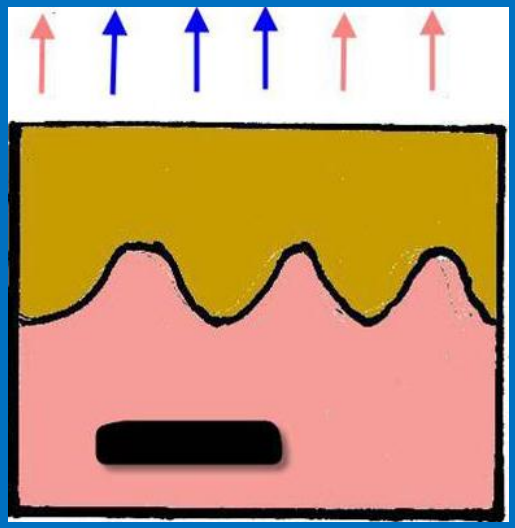
Melanin at the stratum corneum absorbs all light and appears black.



Melanin at the dermo-epidermal junction still absorbs all light but some light is reflected back by particles in the epidermis so it appears brown (near-black).



Melanin in the superficial dermis still absorbs all light reaching it but light scattered back by collagen causes a minor Tyndall effect so there is a slight shift to blue; it appears grey



Melanin in the deep dermis still absorbs all light reaching it but light scattered back by collagen causes a major Tyndall effect so it appears blue

Melanin

Keratin

Keratin & Collagen

Haemoglobin

Black — Melanin in Stratum corneum, congealed blood

Dark brown — Melanin in the epidermis, dense

Light brown — Melanin in the epidermis, delicate

Grey — Melanin in the papillary dermis

Blue — Melanin in the reticular dermis

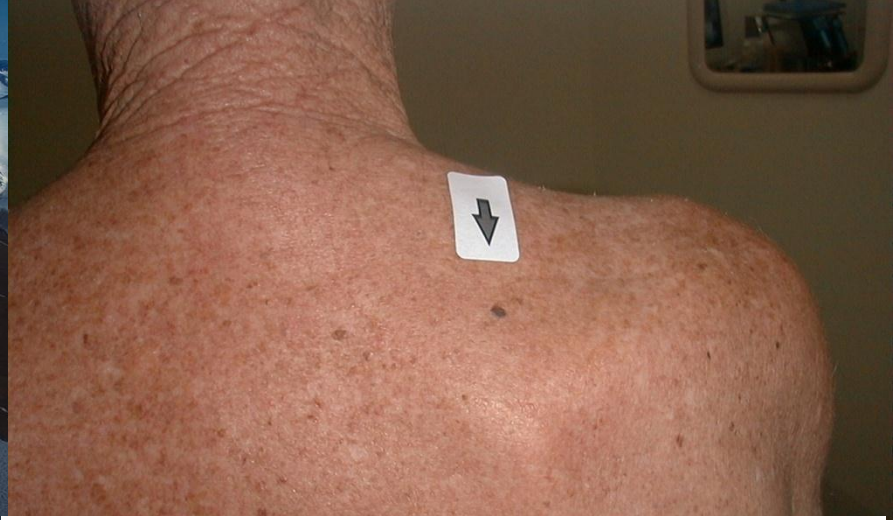
Orange — Combination of melanin and keratin, serum crust

Yellow — Keratin

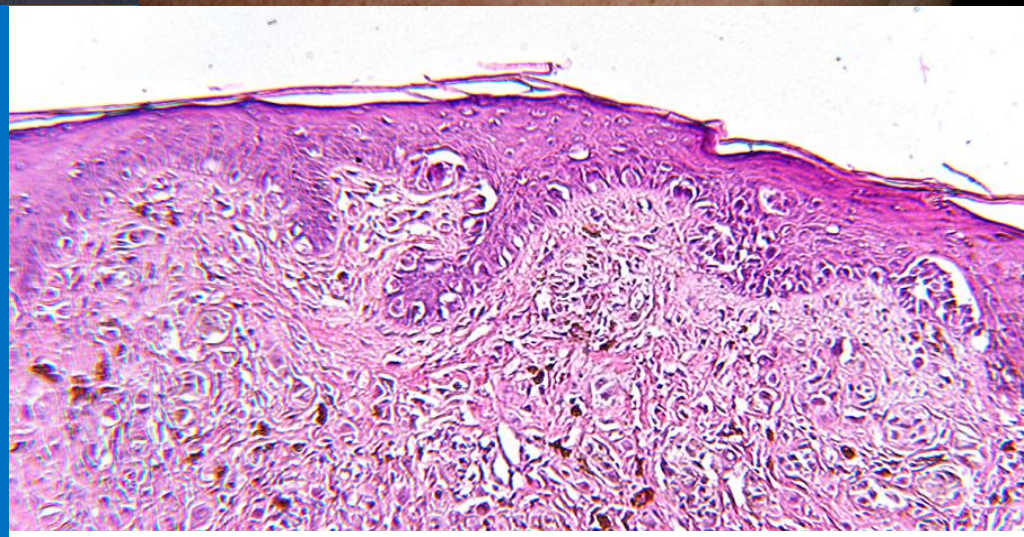
White — Absence of melanin, sclerosis of the dermis, keratin under the stratum corneum

Red — Blood

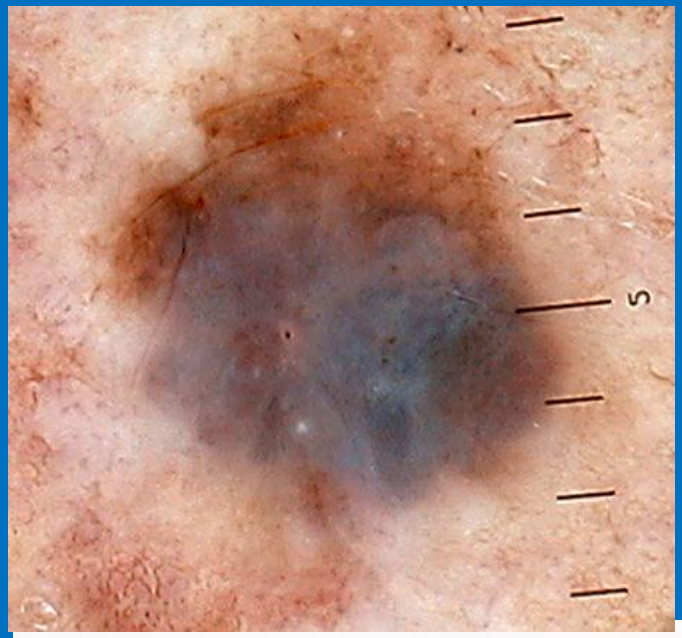
Purple — Blood (poorly oxygenized)



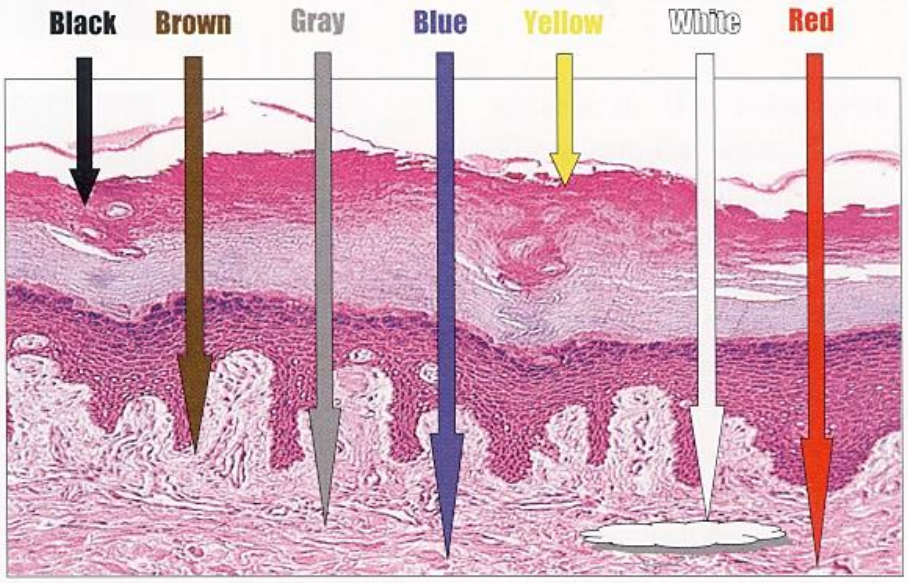
Clinical examination looks at lesions in the horizontal plane



In contrast, conventional microscopy looks at lesions in the vertical plane



Because melanin appears as different colours at different depths in the skin dermatoscopy provides information in both the horizontal and vertical planes. It provides a 3-dimensional view



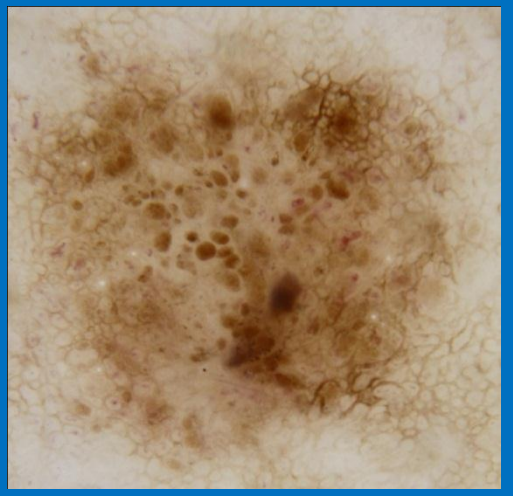
Atlas of Dermoscopy Marghoob Braun Kopf. Page 11

Dermatoscopy – Analysing Patterns

Pattern analysis: describing the patterns in a reproducible and teachable manner.

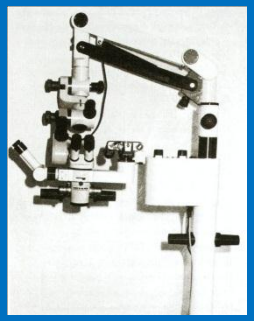
The intention is not to create an image of the lesion but rather to use terms to describe essential features that will be consistently interpreted by other people.

This is analogous to a police description of a suspect.



- Height
- Weight
- Build
- Hair colour
- Eye colour

- Pattern (lines, clods…)
- Colour
- Symmetry
- Clues



Why a new method?

- 1987 – Pehamburger – Classic Pattern Analysis
- 1989 – First hand-held dermatoscope – consensus meeting – metaphoric terminology
- 1994 – Stolz – ABCD rule
- 1996 – Menzies' method
- 1998 – Argenziano – 7 point checklist
- 2000 – Soyer/Argenziano – 3 point checklist
- 2007 – CASH (color, architecture, symmetry, and homogeneity) version of pattern Analysis

[12-17]

Why a new method?

Table II. Algorithm for ELM Criteria Found in PSL

ELM Criterion	Superficial Spreading Melanoma	Nodular Melanoma	Lentigo Maligna Melanoma
Pigment network	Irregular, prominent, wide, abruptly ends at periphery	Irregular, prominent, wide, abruptly ends at periphery (usually visible only as peripheral rim)	Highly irregular, prominent, abruptly ends or thins at periphery
Diffuse pigmentation	Irregular, inhomogeneous, abruptly ends at periphery	Irregular, inhomogeneous, abruptly ends at periphery	Irregular, inhomogeneous, abruptly ends or thins at periphery
Depigmentation	Irregular, bizarre, pink-and-white center and periphery	Irregular, bizarre, pink-and-white center and periphery	Irregular, bizarre, pink-and-white center and periphery
Brown globules	Often present, varied in size and shape, irregularly distributed	Rarely present, varied in size and shape, irregularly distributed	Rarely present, varied in size and shape, irregularly distributed
Black dots	Often present, varied in size and shape, irregularly distributed periphery and center	Often present, varied in size and shape, irregularly distributed periphery	Often present, varied in size and shape, irregularly distributed, periphery and center
Radial streaming	Present	Present	Present
Pseudopods	Present	Present	Rarely present
Gray-blue veil	Present	Present	May be present

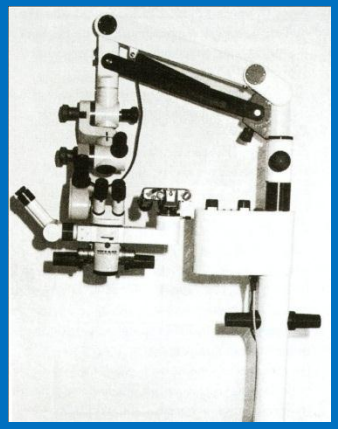
ELM Criterion	Lentigo Maligna Melanoma *In situ*	Lentigo Simplex, Nevoid Lentigo
Pigment Network	Irregular, prominent, wide, abruptly ends or thins at periphery	Regular, periphery prominent, narrow, gradually thins at periphery
Diffuse Pigmentation	Irregular, inhomogeneous, abruptly ends at periphery	Regular, homogeneous center
Depigmentation	Irregular, bizarre, pink-and-white center and periphery	Absent
Brown globules	Rarely present, varied in size and shape, regularly distributed	Absent
Black dots	Rarely present, varied in size and shape, irregularly distributed	Absent
Radial streaming	Present	Absent
Pseudopods	Absent	Absent
Gray-blue veil	Absent	Absent

ELM Criterion	Dysplastic Nevus	Junctional Nevus	Dermal Nevus	Compound Nevus
Pigment network	Irregular, discrete, focally prominent, abruptly ends or thins at periphery	Regular, prominent, thins at periphery	Absent	Regular, discrete, thins at periphery
Diffuse pigmentation	Irregular, intense, inhomogeneous, center, periphery abruptly ends at periphery	Regular, intense, homogeneous center thins at periphery	Regular, faint, homogeneous throughout lesion, thins at periphery	Regular, faint homogeneous center and periphery, thins at periphery

Classic Pattern Analysis has still not been surpassed in accuracy when applied by experts but there is no simple flow-chart method. It is complex.

[11]

Why a new method?



A= Asymmetry. Score (0-2)x1.3

B= Border sharpness. Score (0-8)x0.1

C= Colours (light brown, dark brown, black, red, white, blue-grey. Score (1-6)x0.5

D= Dermoscopic structures (Dots, globules, structureless, network, branched streaks. Score (1-5)x0.5

Benign <4.75
Suspicious 4.75-5.45
Malignant >5.45

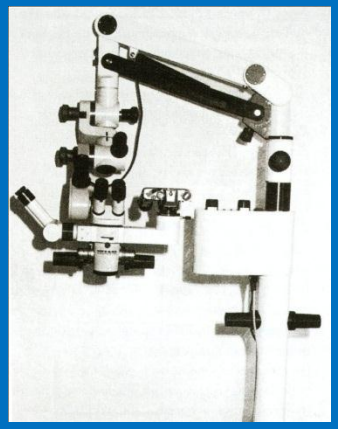
Major criteria? – 2 points
Minor criteria? – 1 point
> Or = 3 – Melanoma

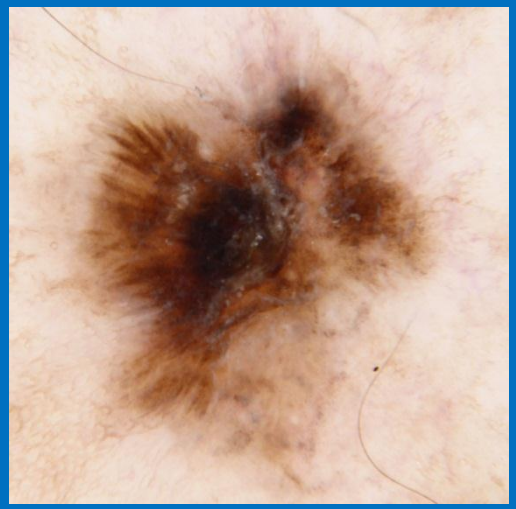
Melanocytic criteria?
Melanocytic by default?
Not a single colour
Not symmetrical
One of 9 clues?
Special site clues?

?

Many of the methods require calculations which makes application in real practice cumbersome.

Why a new method?



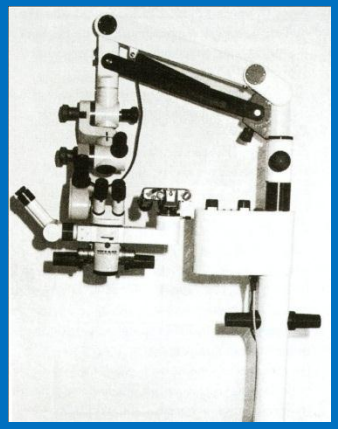


Metaphoric terminology

?

With metaphoric terminology the structures at the upper left of this image would be termed radial-streaming if it was believed to be a melanoma or leaf-like structures if it was thought to be a BCC. The practice of having a pre-conceived diagnostic implication built into the description is contrary to fundamental principles of the science of medicine. We use the term “lines radial segmental” which does not miss-lead diagnostically. This is pigmented SCC in-situ.

Why a new method?



2-step process

Step 1: Is it melanocytic?

Step 2: Is it a melanoma?

?

We argue that this is not appropriate because you want to identify non-melanocytic malignancies too. Also it is complex as seen on the next slide so it adds an unhelpful level of complexity which we believe is both inappropriate and unnecessary.

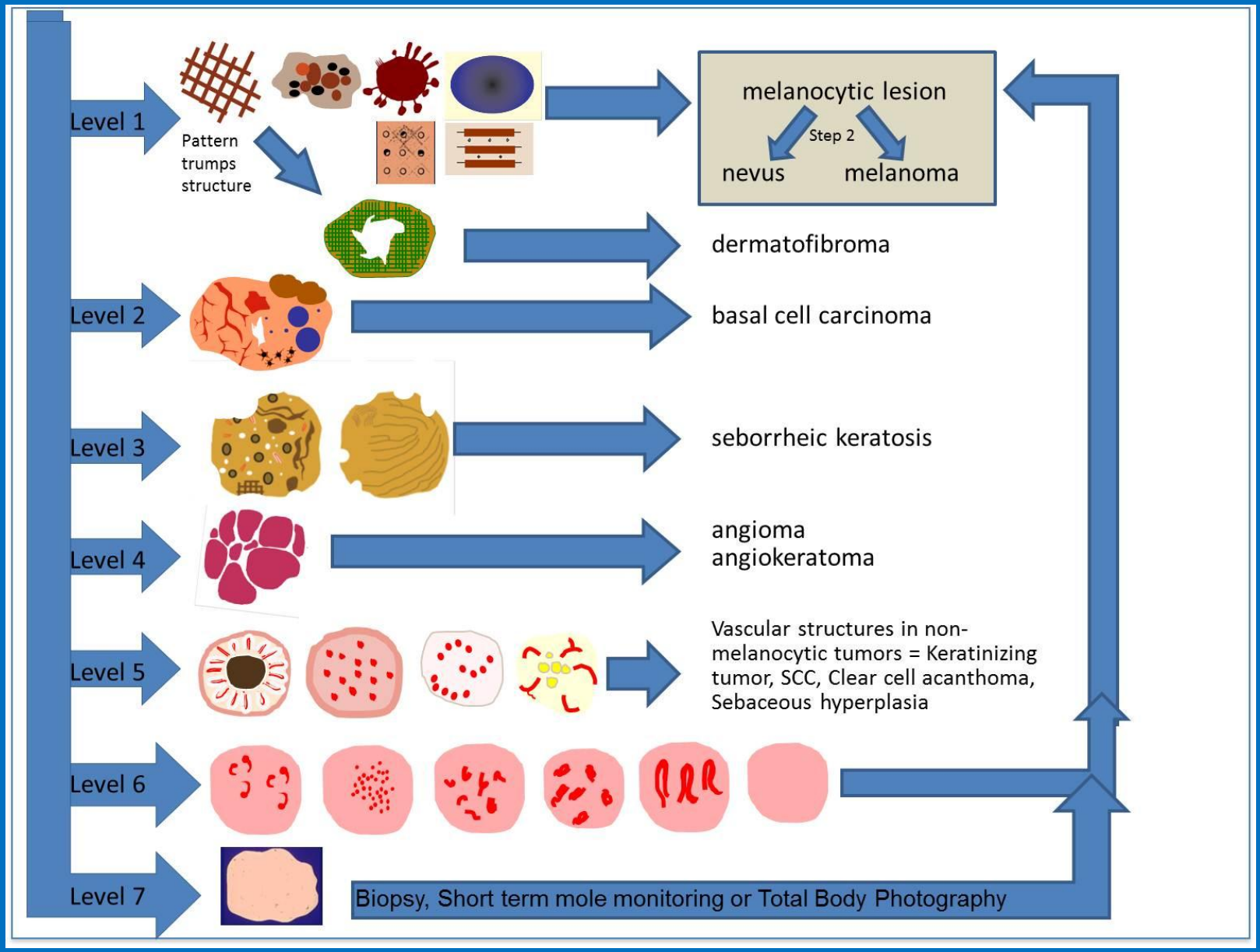


Image courtesy Ashfaq A Marghoob

The “two-step process” of dermatoscopy

2007
Revised pattern Analysis – Harald Kittler

Dermatopathology: Practical & Conceptual January - March 2007 >

3. New Heights: Dermatoscopy: Introduction of a new algorithmic method based on pattern analysis for diagnosis of pigmented skin lesions

Harald Kittler, M.D.

SEE ALSO
- algorithmic method
- dark's nevus
- dermatoscopy

Introduction

Why the need for a new method?

Dermatoscopy has become a widely used technique for diagnosis of pigmented lesions of the skin. Beginners in dermatoscopy often are confused by the lack of precise, repeatable criteria and opaque terminology. Conventional descriptions of structures observed by dermatoscopy employ images that do not correspond to those in the brain of most viewers. The language established universally is jargon of a fraternity and is not suitable for communication in a scientific discipline. What follows now are examples of nomenclature in dermatoscopy that are misleading.

1. Incomprehensible terms

The images invoked by metaphoric terms and opaque expressions result inevitably in failure to conjure the very same construct in the brain of any two individuals.

Examples: "Leaf-like areas," "fingerprint-like structures," "fat fingers," "radial streaming," "moth-eaten border," "blue gray veil," and "honeycomb-like pattern." Those images impede repeatable diagnosis by dermatoscopy and prevent rational communication between dermatoscopists.

2. Contradictory terms

There is no consistency in the naming of dermatoscopic structures.

Examples: "Globules" are described as "brown, black or red spherical or ovoid structures with diameters usually greater than 0.1mm," yet "large blue-gray ovoid nests" are defined as "circumscribed, blue-gray, ovoid structures larger than globules." The first definition conveys the notion that all ovoid structures greater than 0.1 mm in diameter are globules and, therefore, ovoid nests must be globules, even though a globule ("a tiny globe or ball") and a nest ("a structure resembling a bird's nest") is round, not ovoid. "Cobblestone globules" are defined as "polyglonal globules," but according to the first definition, globules are not polygonal but are either spherical or ovoid.

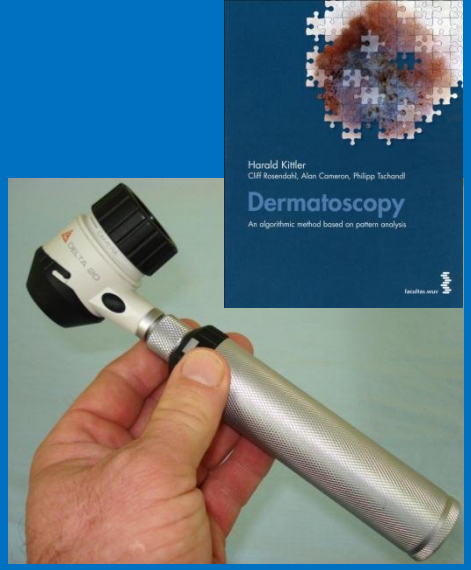
Revised Pattern Analysis

Pattern + Colours + Clues = Diagnosis

DESCRIPTION PRECEDES DIAGNOSIS! **Describing a lesion assists the cognitive process. Metaphoric terms with preconceived diagnostic implications are not used.**

Revised Pattern Analysis

- **Rebuilds** from the firm foundation of Classic Pattern Analysis (no subsequent system gave better results)
- **Iconoclastic** - Poorly defined confusing metaphorical language replaced by clearly defined geometric terminology
- **No need to decide melanocytic status** as a (hazardous) first step



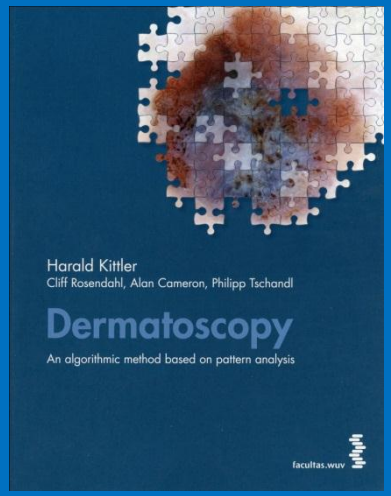
Revised Pattern Analysis

Patterns + Colours + Clues = Diagnosis

Analogous to

Inspect + palpate + percuss + auscultate = Diagnosis

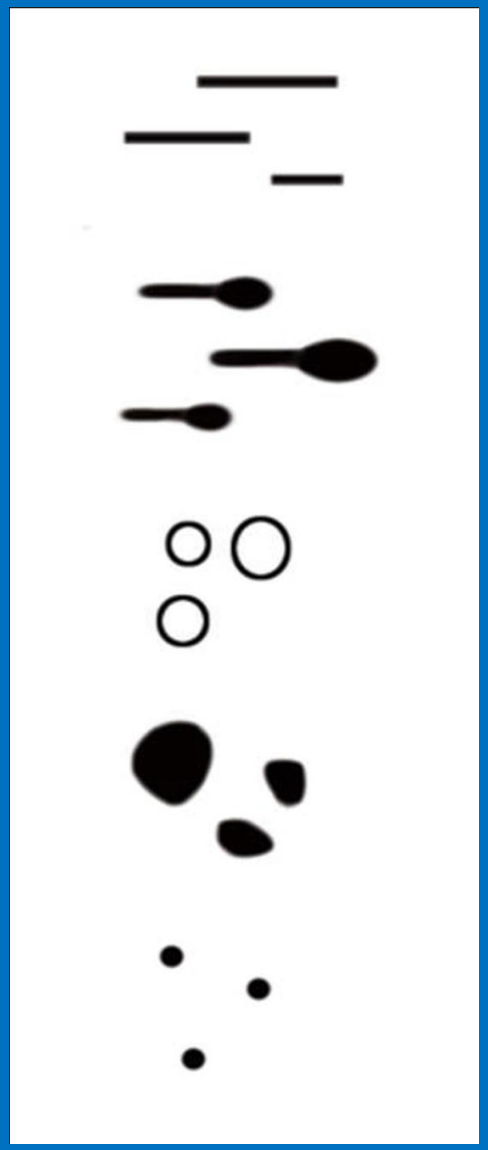
Revised Pattern Analysis



Pattern + Colours + Clues = Diagnosis

- A pattern is made up of multiple repetitions of a basic structure
  Is should cover a significant area (at least 25-30%)

- There are 5 basic structures



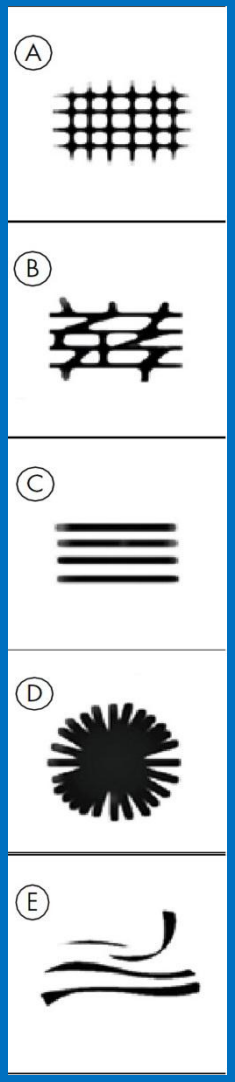
Lines

Pseudopods

Circles

Clods

Dots



Reticular

Branched

parallel

Radial

Curved

Definitions

Line : a two-dimensional continuous object with length greatly exceeding width

Pseudopod: a line with a bulbous end

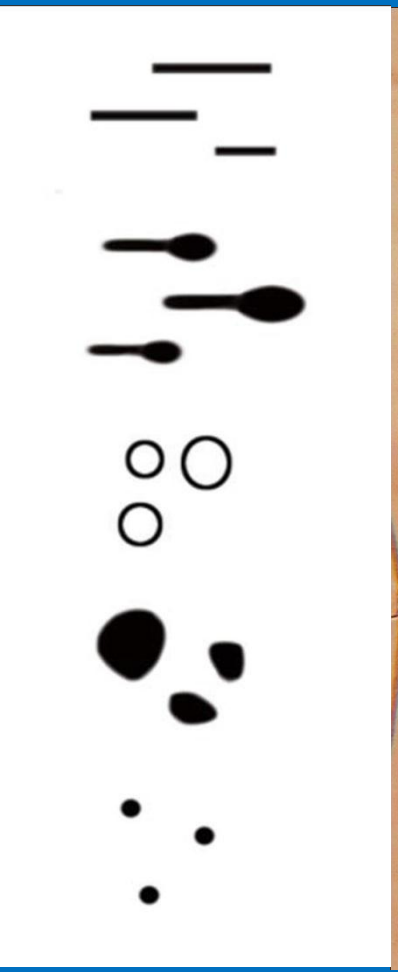
Circle: a curved line equidistant from a central point

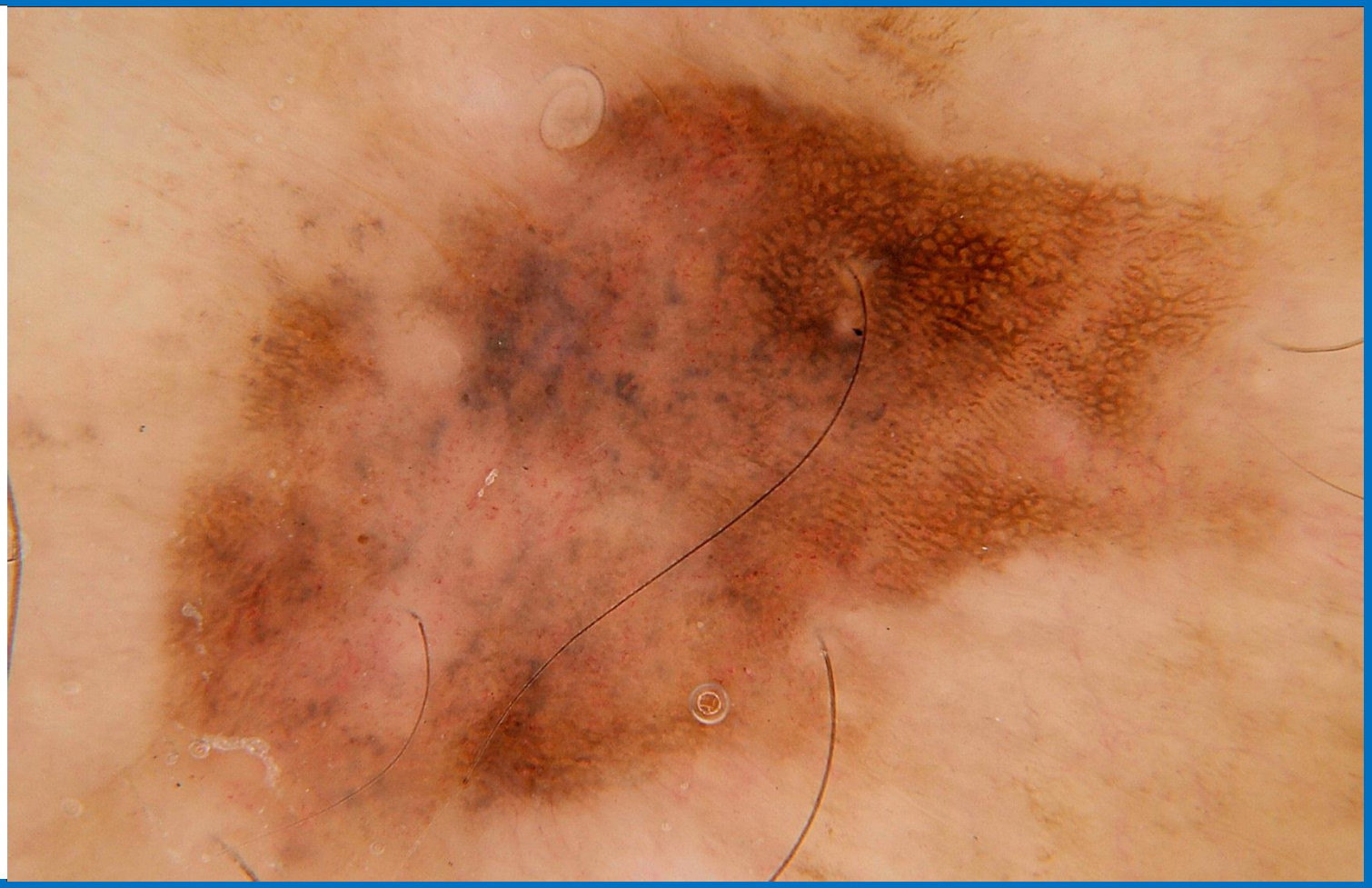
Clod: any well circumscribed, solid object larger than a dot. Clods may take any shape

Dot: an object too small to have a discernable shape

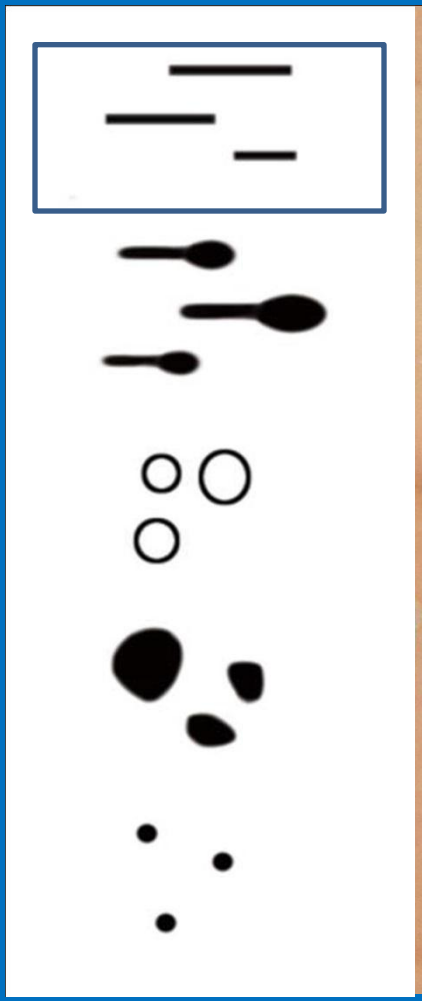
Structureless: An area with no basic structure predominating

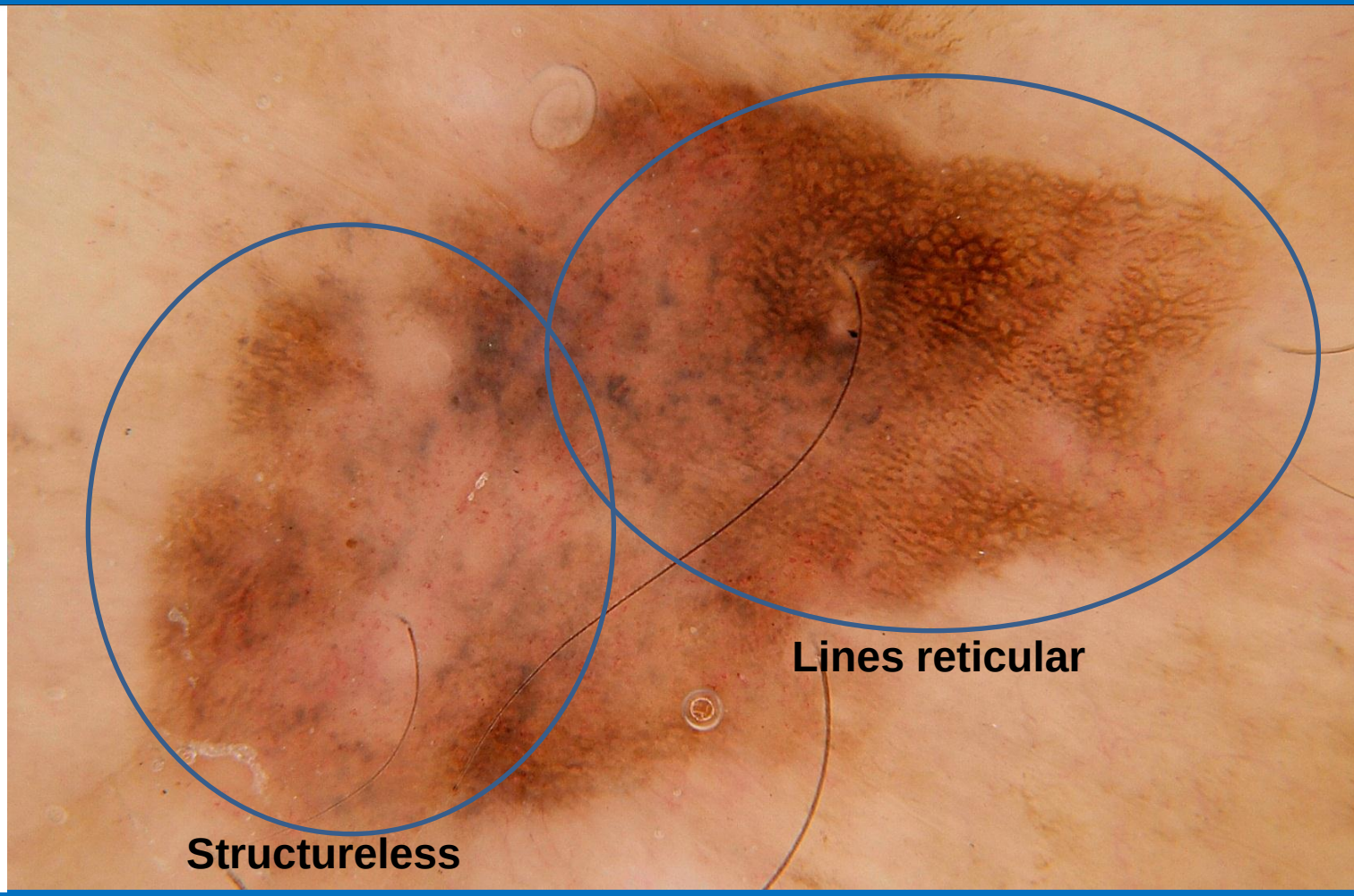
A pattern is made up of multiple repetitions of a basic structure



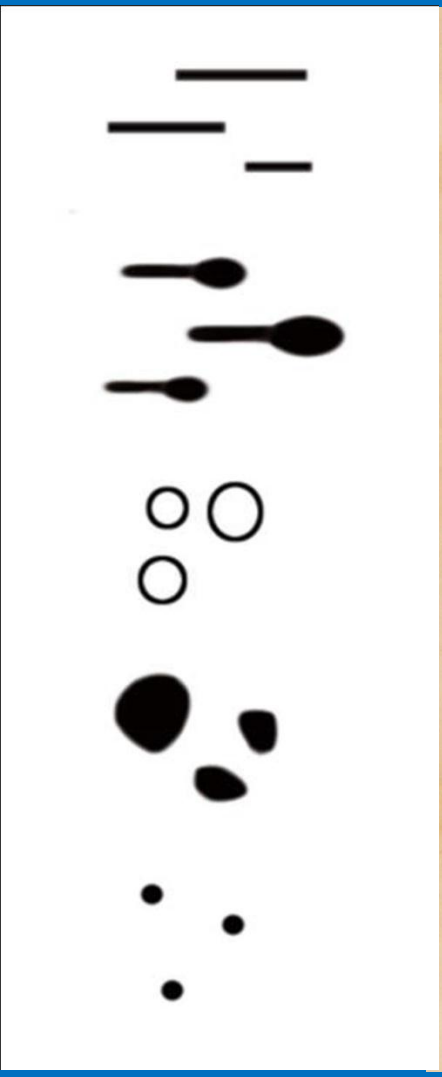


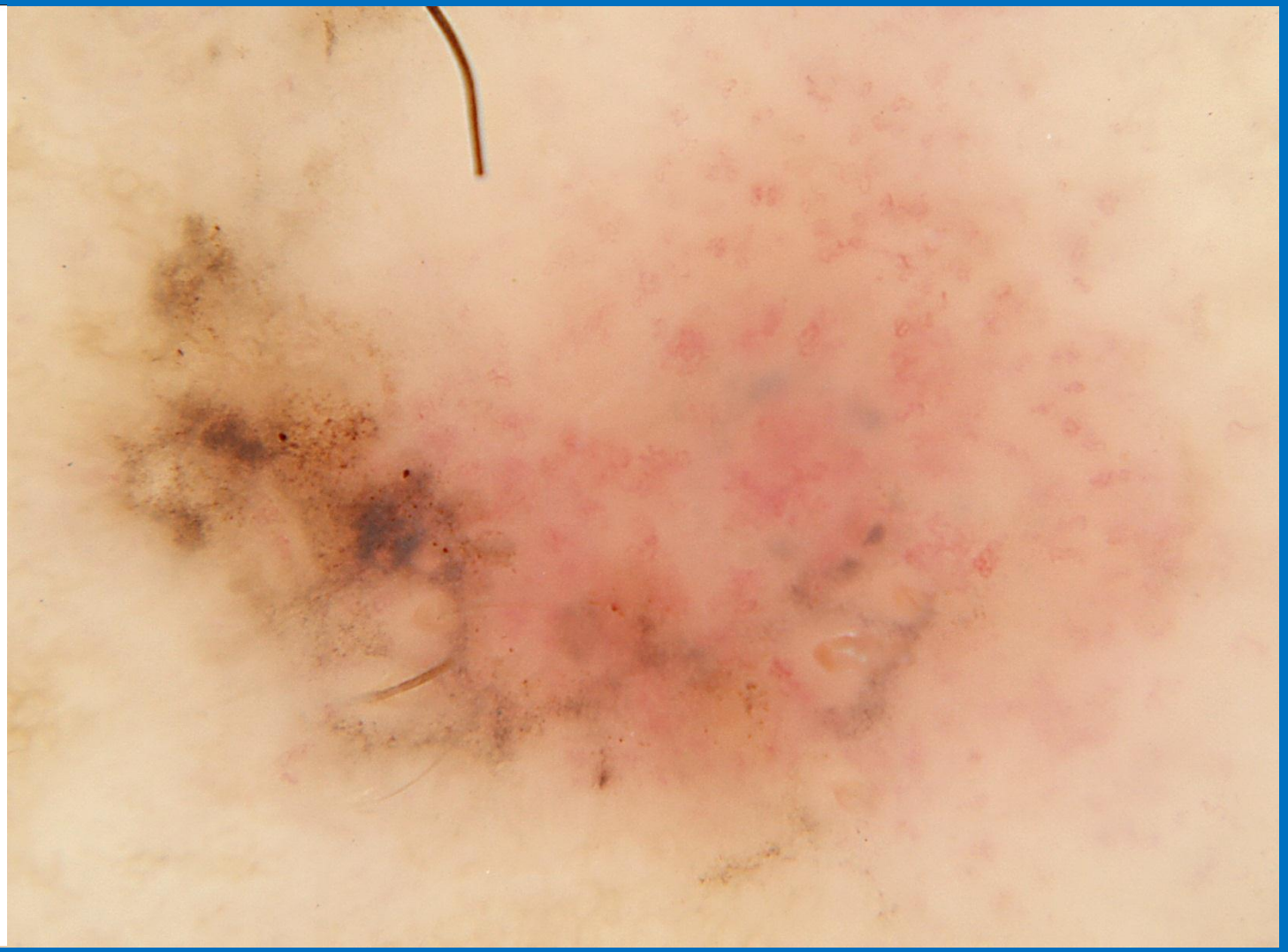
What patterns do you see here?



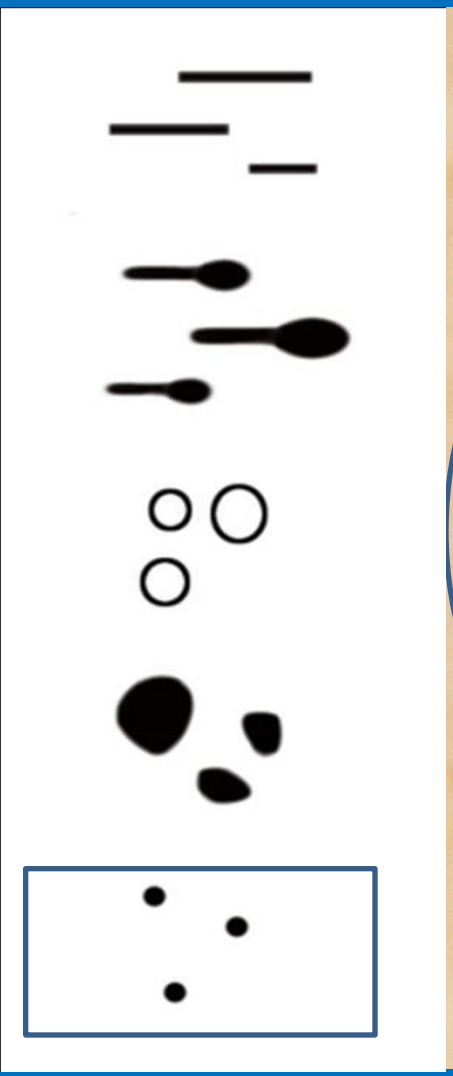


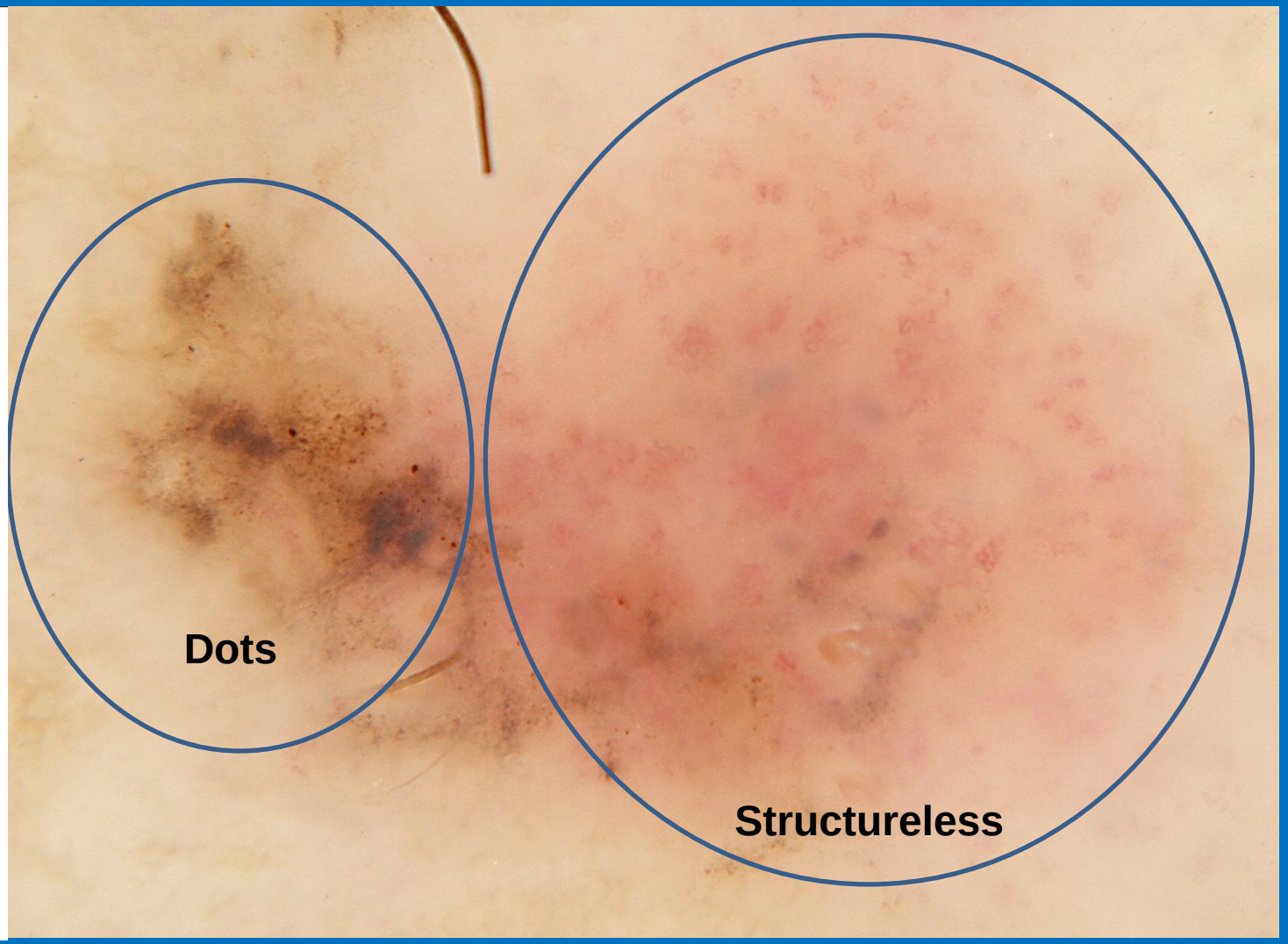
Structureless areas are not necessarily featureless. If no single structure predominates it is structureless. This lesion has reticular lines but it is a solar lentigo/SCC in-situ collision, both of which are non-melanocytic. Only the pathologist can see melanocytes!



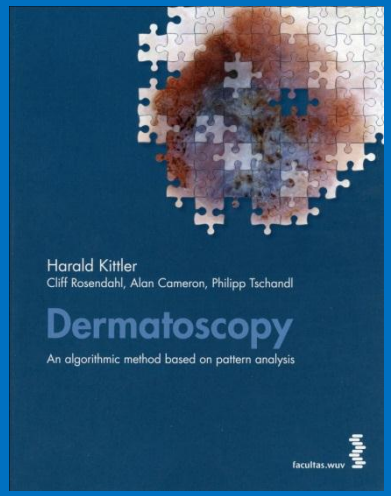


What patterns do you see here?




Dots
Structureless

Revised Pattern Analysis



Pattern + Colours + Clues = Diagnosis

Melanin

Keratin

Keratin & Collagen

Haemoglobin

Black — Melanin in Stratum corneum, congealed blood

Dark brown — Melanin in the epidermis, dense

Light brown — Melanin in the epidermis, delicate

Grey — Melanin in the papillary dermis

Blue — Melanin in the reticular dermis

Orange — Combination of melanin and keratin, serum crust

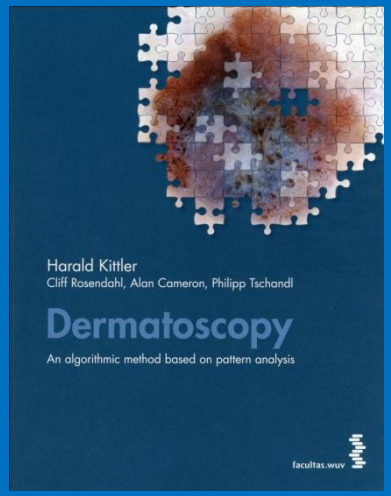
Yellow — Keratin

White — Absence of melanin, sclerosis of the dermis, keratin under the stratum corneum

Red — Blood

Purple — Blood (poorly oxygenized)

Revised Pattern Analysis

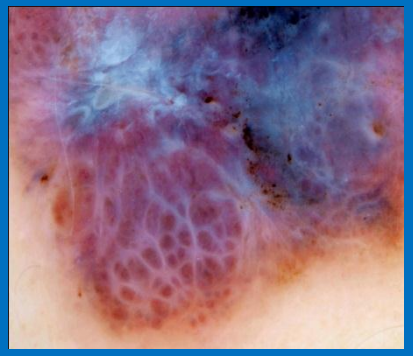


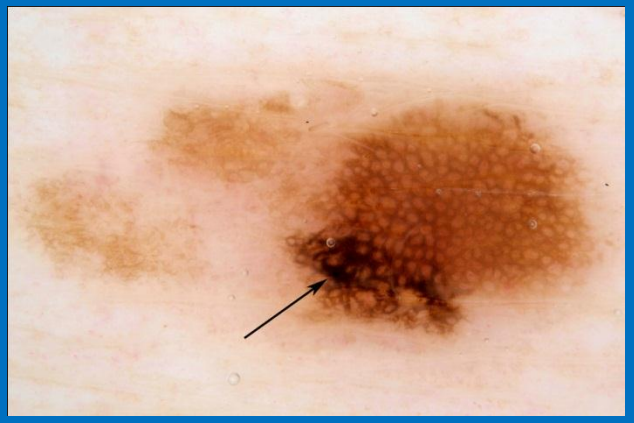
Pattern + Colours + Clues = Diagnosis

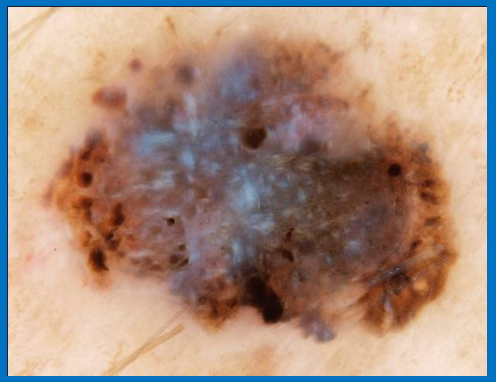
Clues to Specific Malignancies

Clues to Melanoma

- Structures and/or colours combined asymmetrically
- Grey or blue structures
- Eccentric structureless area
- Thick lines reticular
- Black clods or dots, peripheral
- Lines radial or pseudopods, segmental
- Lines white
- Lines parallel ridges (acral) or chaotic (nails)
- Polymorphous vessels
- Polygons



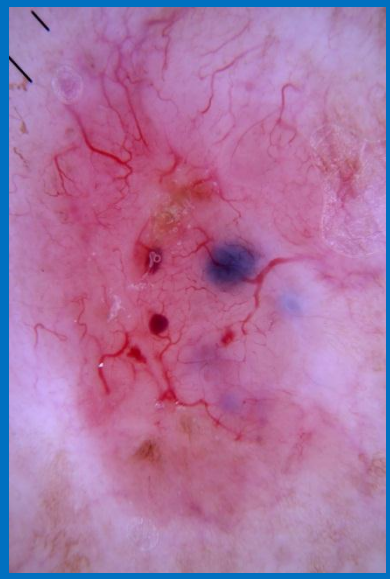


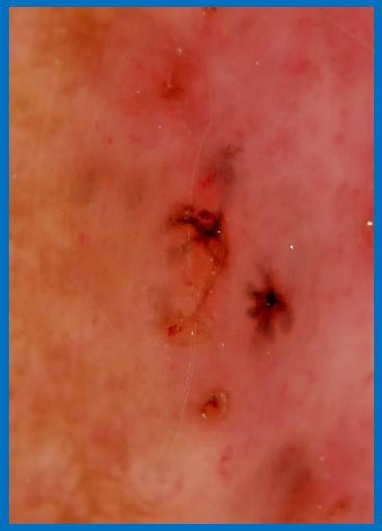


Clues to Pigmented BCC

Absence of lines reticular plus one or more of:-

- ***Ulceration***
- **Branched serpentine vessels (polymorphous vessels are common, especially if there is extensive ulceration but if that includes a pattern of dot vessels that points to melanoma**
- **Lines radial peripheral or central, converging**
- **Blue clods (more likely than blue structureless areas)**

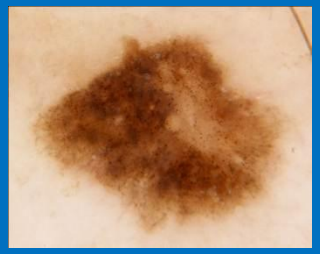


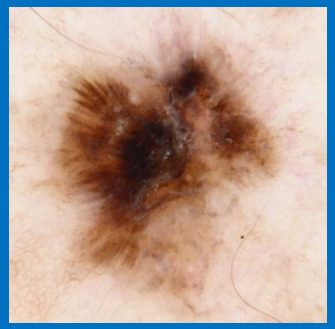


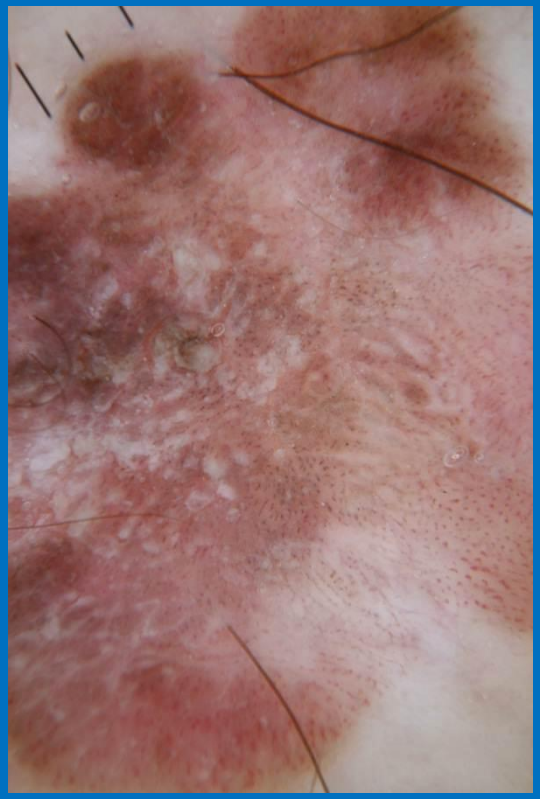
Clues to Pigmented SCC in-situ (pIEC or pBowens diease)

Absence of lines reticular plus one or more of:-

- **Surface keratin**
- **Location on sun-damaged skin**
- ***Dots (pigmented or pink/red) in a linear arrangement***
- **Hypopigmented structureless area**
- **Lines radial peripheral segmental**







CHAOS & CLUES

Pattern + Colours + Clues(8) = Malignancy

Chaos + Clues(8) = Malignancy

(Asymmetry of structure and/or colour)

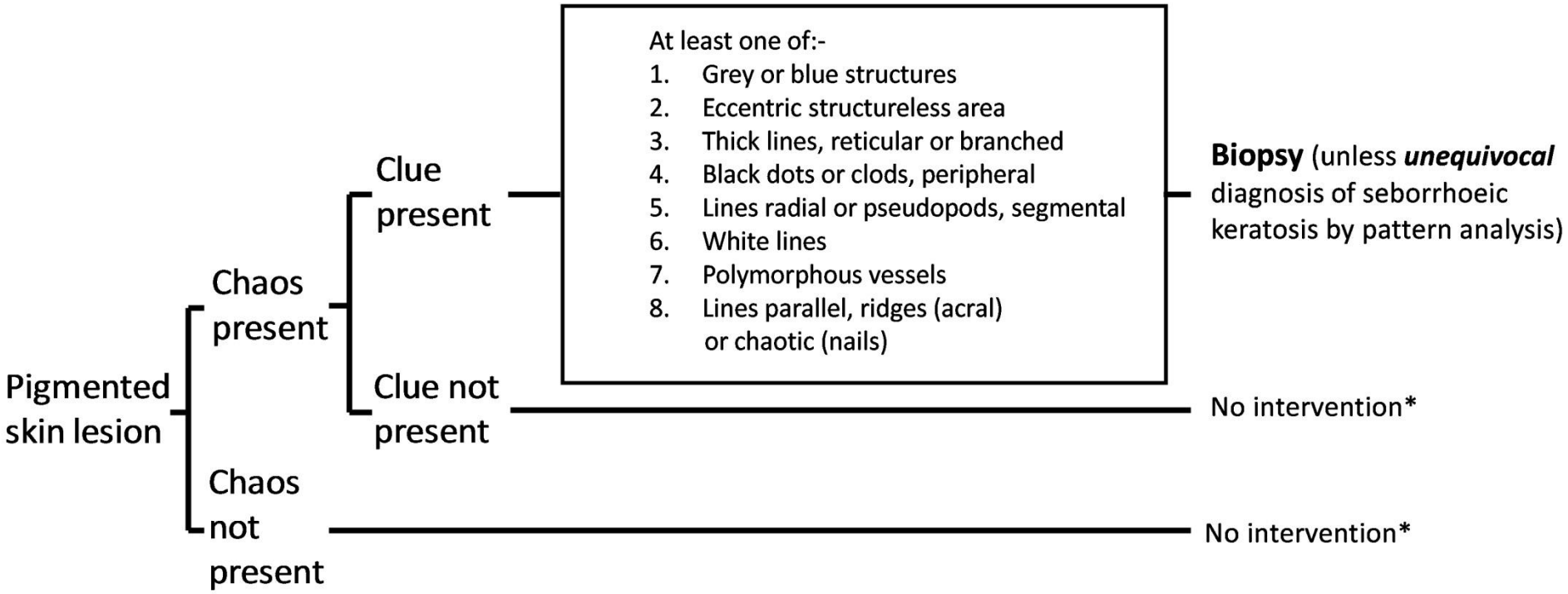
FOCUS Skin cancer

Cliff Rosendahl
Alan Cameron
Ian McColl
David Wilkinson

Dermatoscopy in routine practice

'Chaos and Clues'

Rosendahl C, Cameron A, McColl I, Wilkinson D. Dermatoscopy in routine practice - "Chaos and Clues". Aust Fam Physician. 2012 Jul;41(7):482–7.



* Exceptions to "No intervention"

1. Changing lesions on adults
2. Nodular or small lesions with any clue
2. Dermatoscopic grey on head or neck
4. Parallel ridge pattern (palms or soles)

Any "biopsy" of a lesion for which melanoma is in the differential diagnosis should ideally include the entire specimen. The architecture of the lesion is often critical in making a diagnosis of melanoma.

[1]

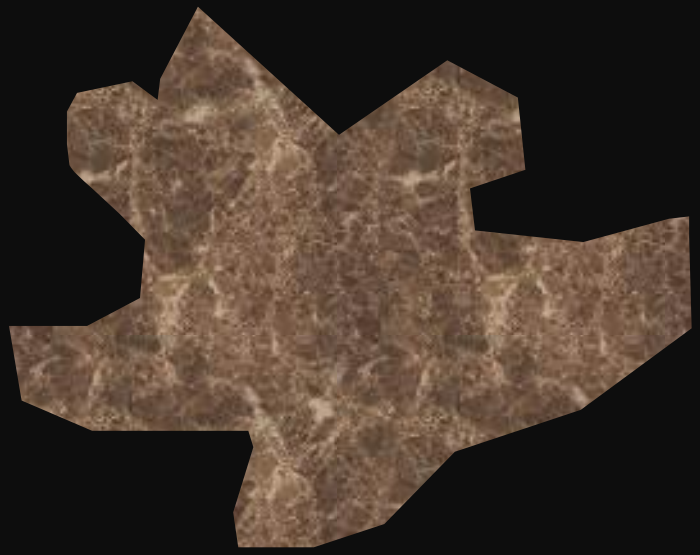
CHAOS

Asymmetry of structure and/or colour

‘Symmetry’ is based on pattern, not on outline

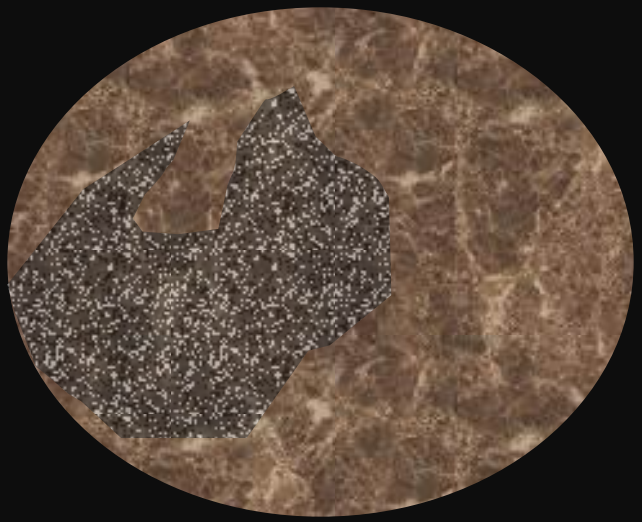
Definition of Symmetry / Asymmetry

Symmetry of PATTERN
(but asymmetry of shape)

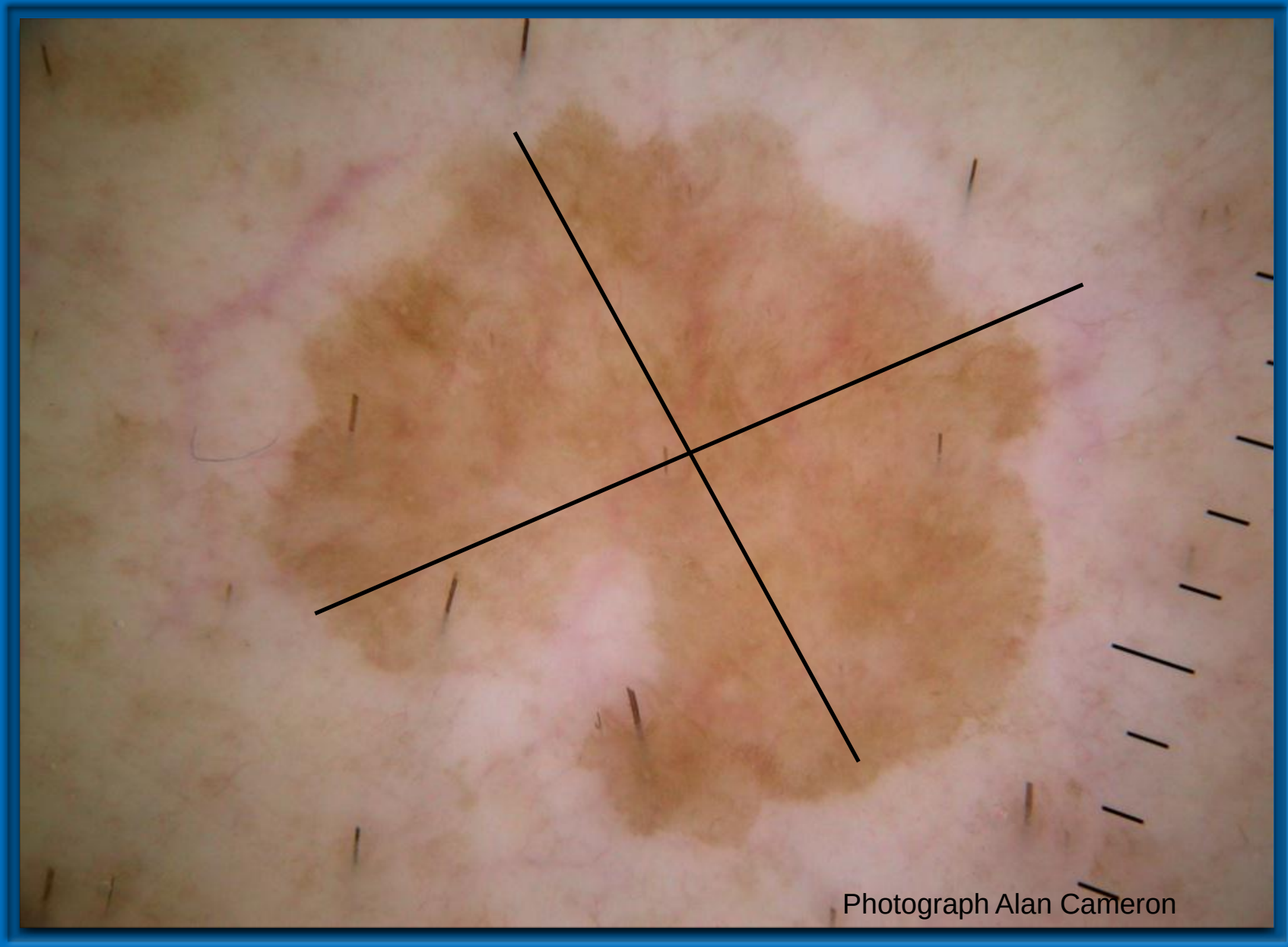


Clinically this would be an asymmetric lesion, however; dermoscopically this is symmetric

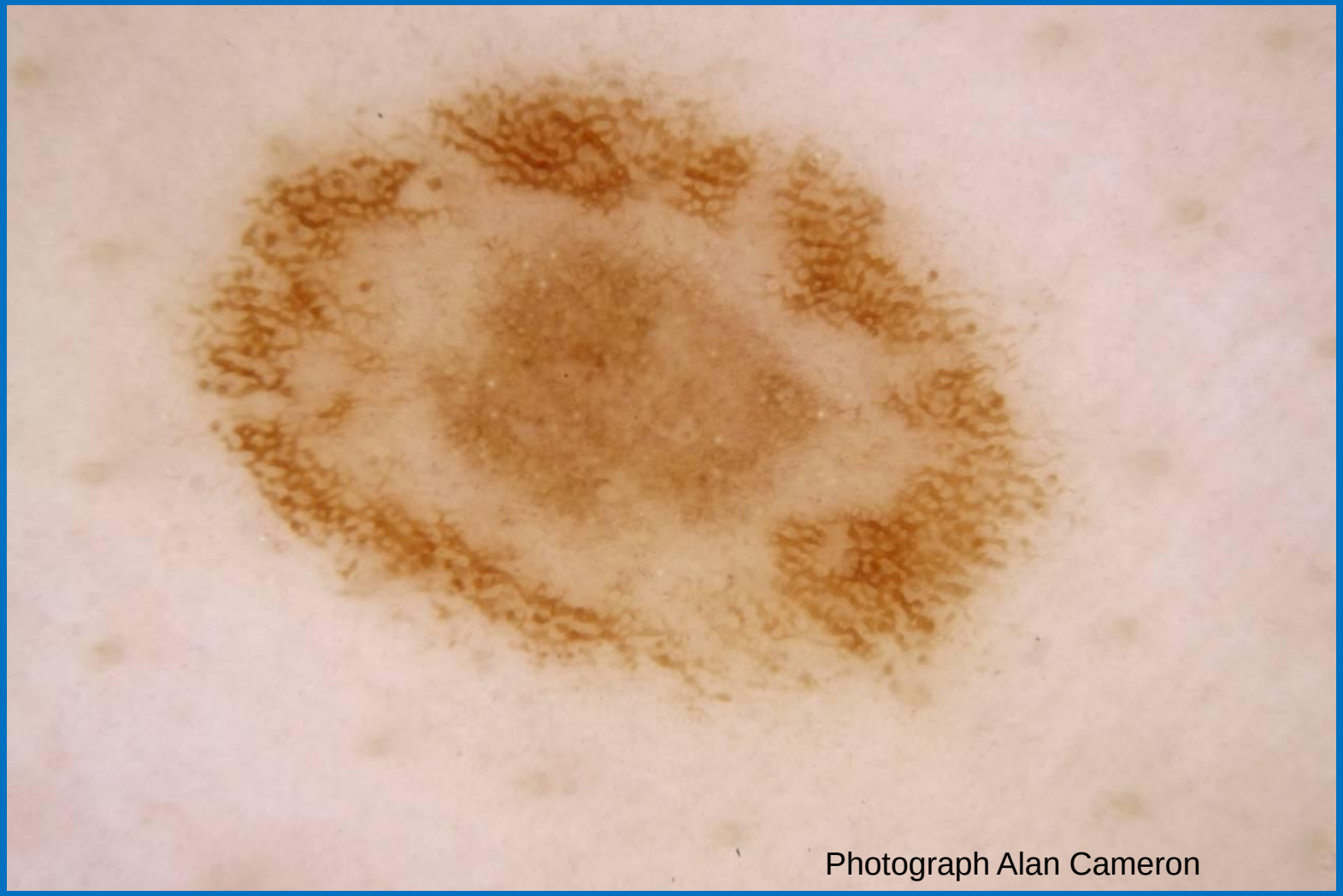
Asymmetry of PATTERN
(but symmetry of shape)



Clinically this would be a symmetric lesion, however; dermoscopically this is asymmetric



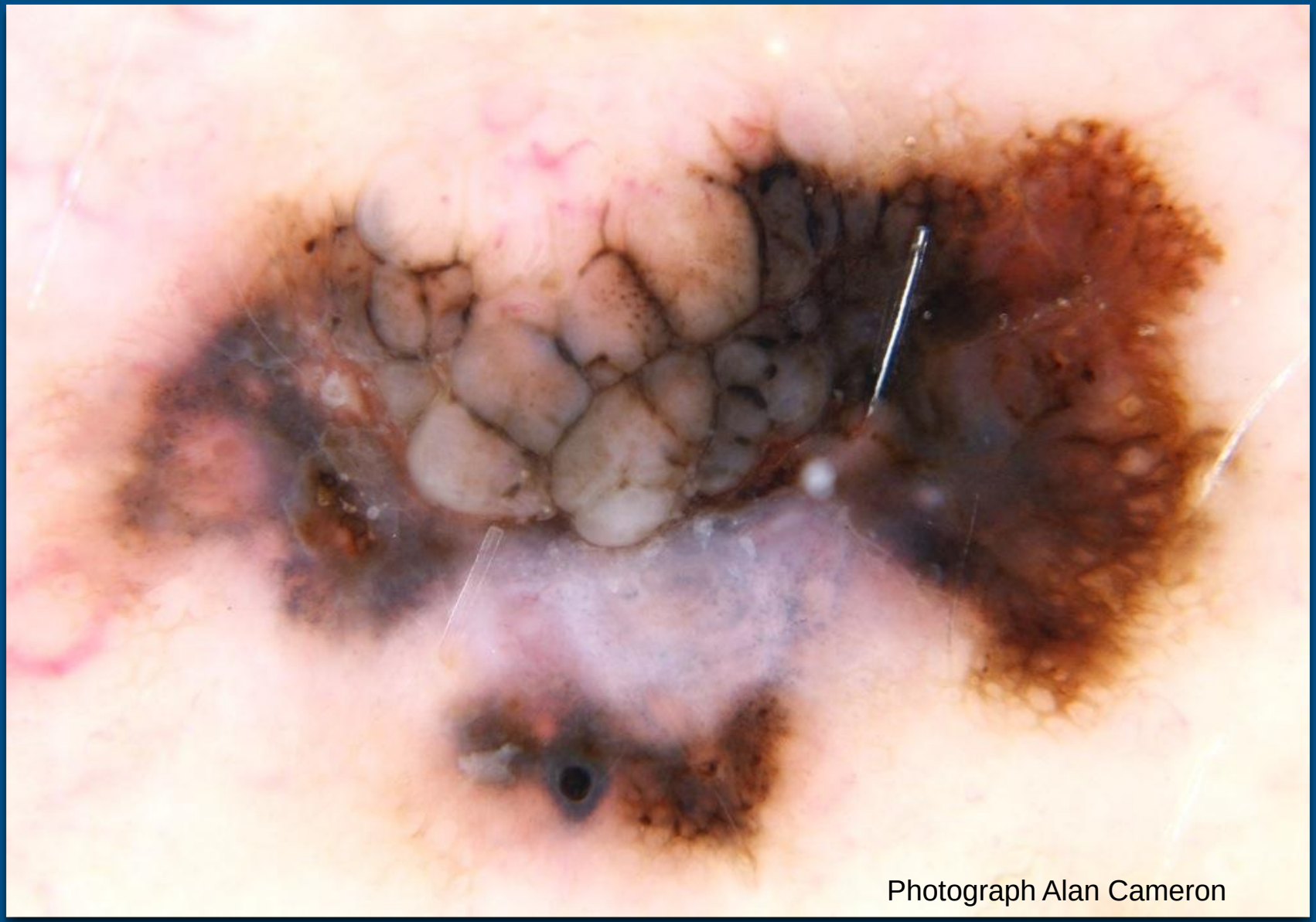
NOT chaotic



concentric = no chaos

Be suspicious of other combinations of more than one pattern or colour

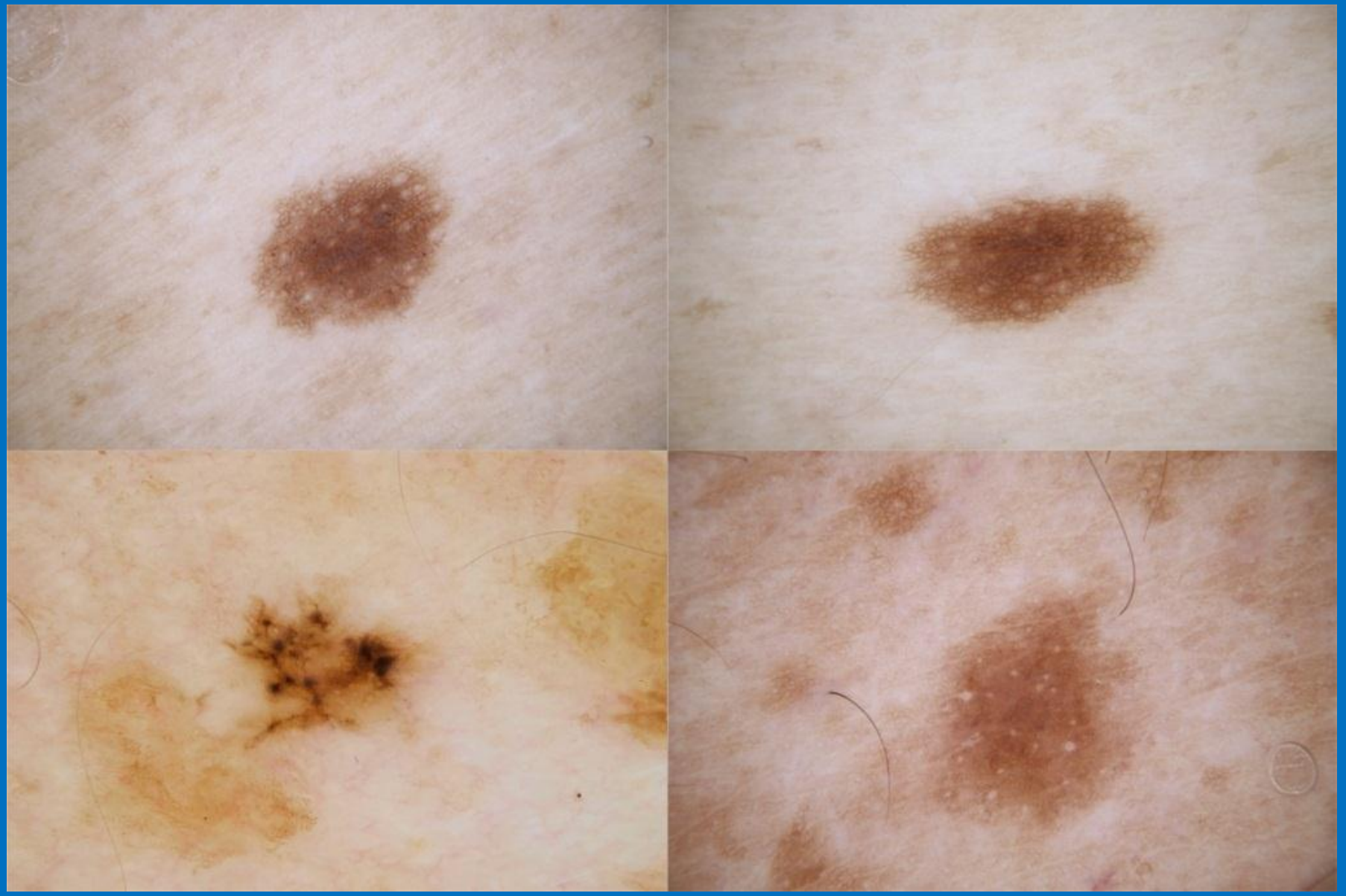
Biologic symmetry is not like architectural symmetry; allow some latitude



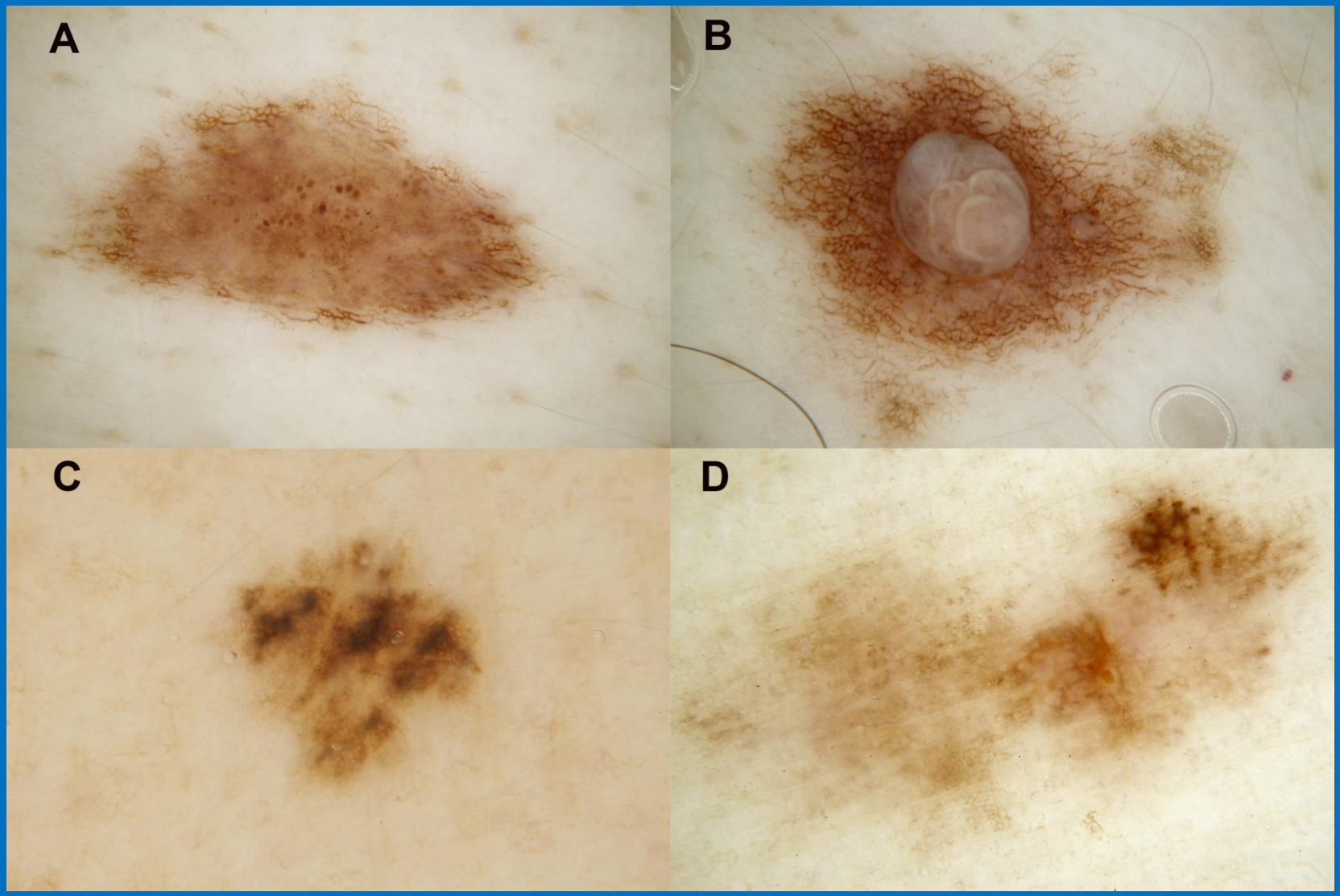
Chaotic

Chaos?

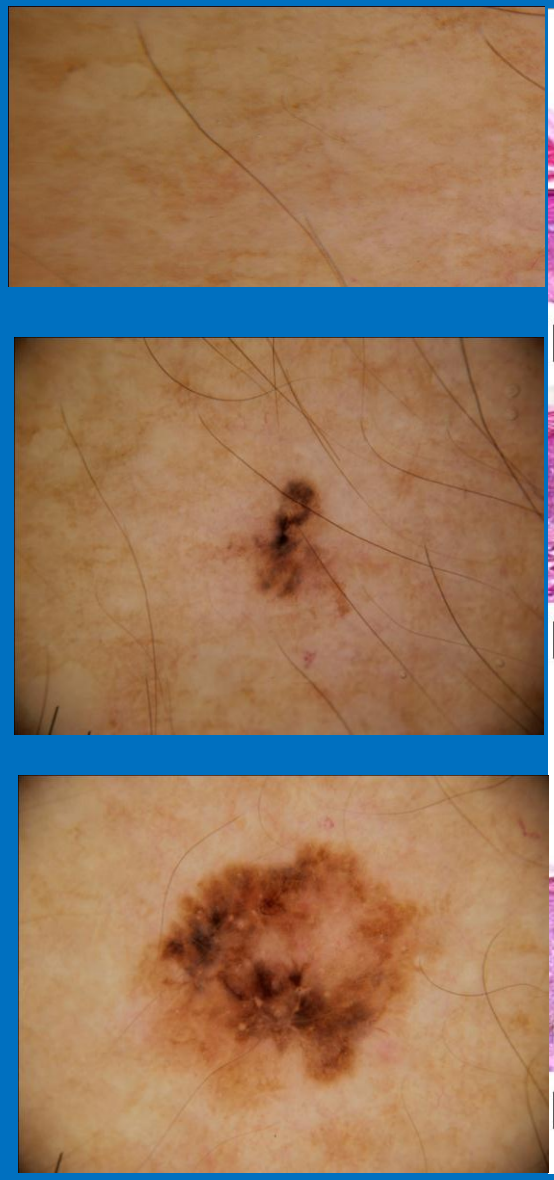
How does it work in practice?
4 lesions - 1 patient 1 day



Invasive melanoma lower left. The other three have no chaos and were not excised



A, B and C are symmetrical when outline is disregarded. D is clearly chaotic. It is a melanoma



Dermatoscopic chaos correlates with dermatopathologic chaos

CHAOS – In a Blink!

SCAN for CHAOS

The presence or absence of CHAOS can usually be assessed at the speed of a blink! With practice it is a scanning assessment

If you cannot decide – manage as chaotic

In contrast to scanning for CHAOS the search for

CLUES involves careful examination

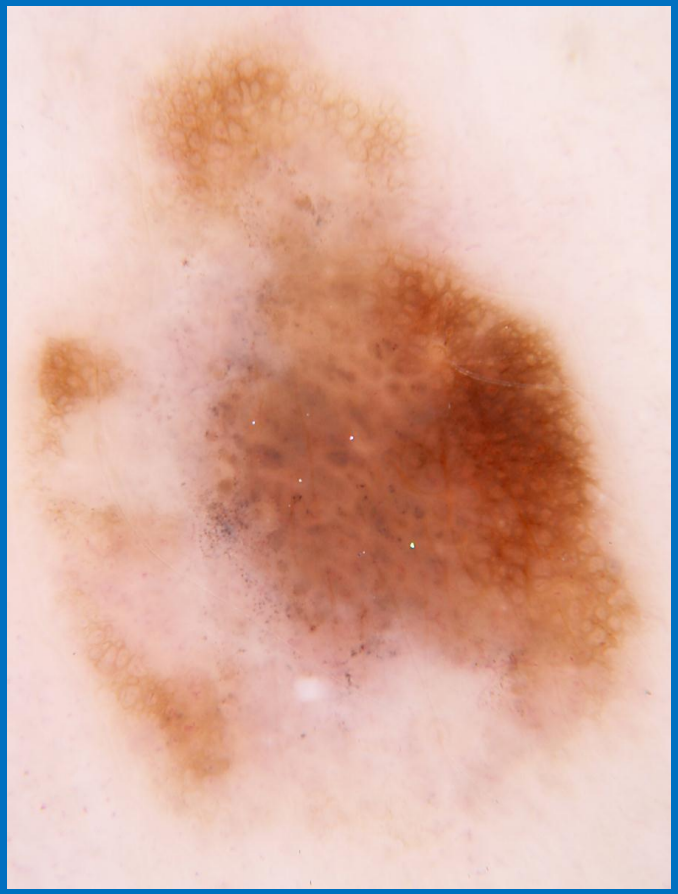
CLUES TO MALIGNANCY
(Chaos and Clues)

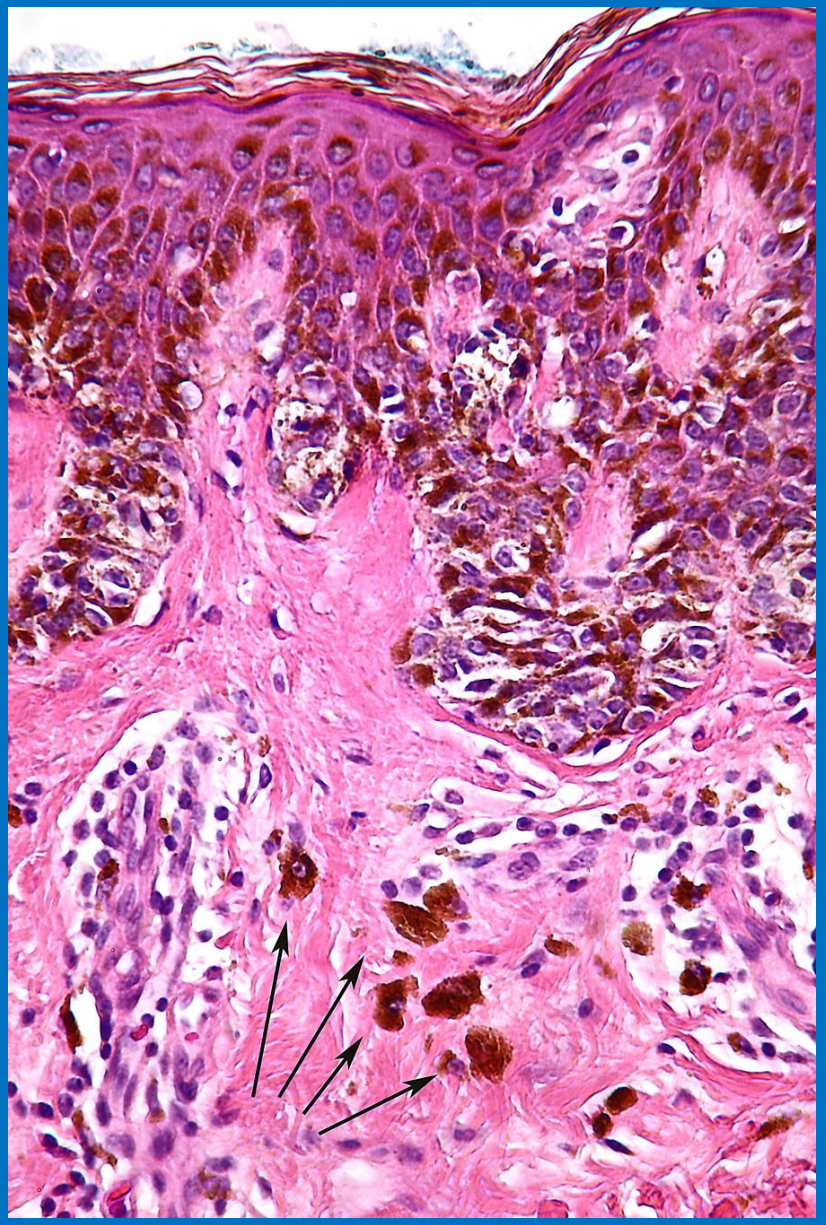
At least one of:-

1. Grey or blue structures
2. Eccentric structureless area
3. Thick lines, reticular or branched
4. Black dots or clods, peripheral
5. Lines radial or pseudopods, segmental
6. White lines
7. Polymorphous vessels
8. Lines parallel, ridges (acral) or chaotic (nails)

1. Grey or blue structures

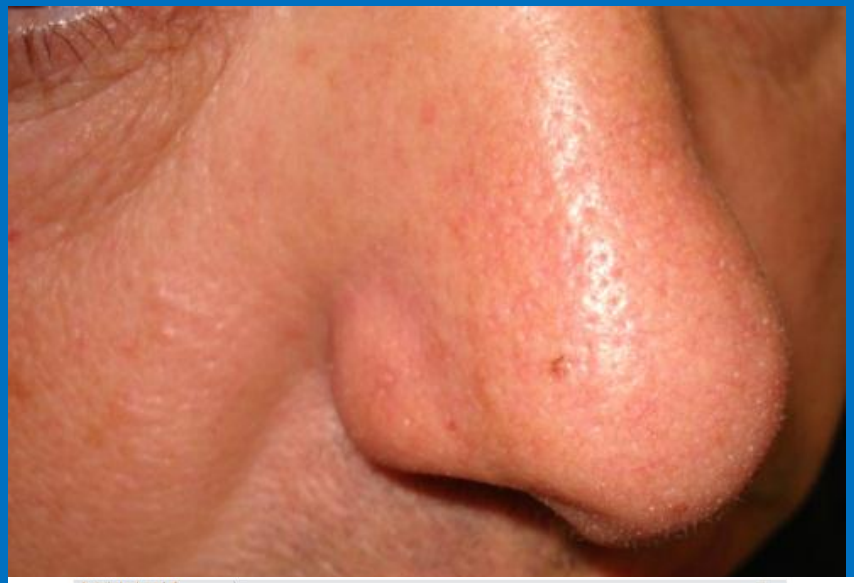
Very sensitive (most melanomas, even in-situ, have this clue) but not as specific. View every chaotic lesion with grey as suspicious. A second clue greatly increases specificity





Grey dots in this in-situ melanoma correlate with melanin incontinence

1. Grey or blue structures



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doi: 10.1111/j.1440-0960.2010.00725.x

BRIEF REPORT

Dermatoscopy of a minute melanoma

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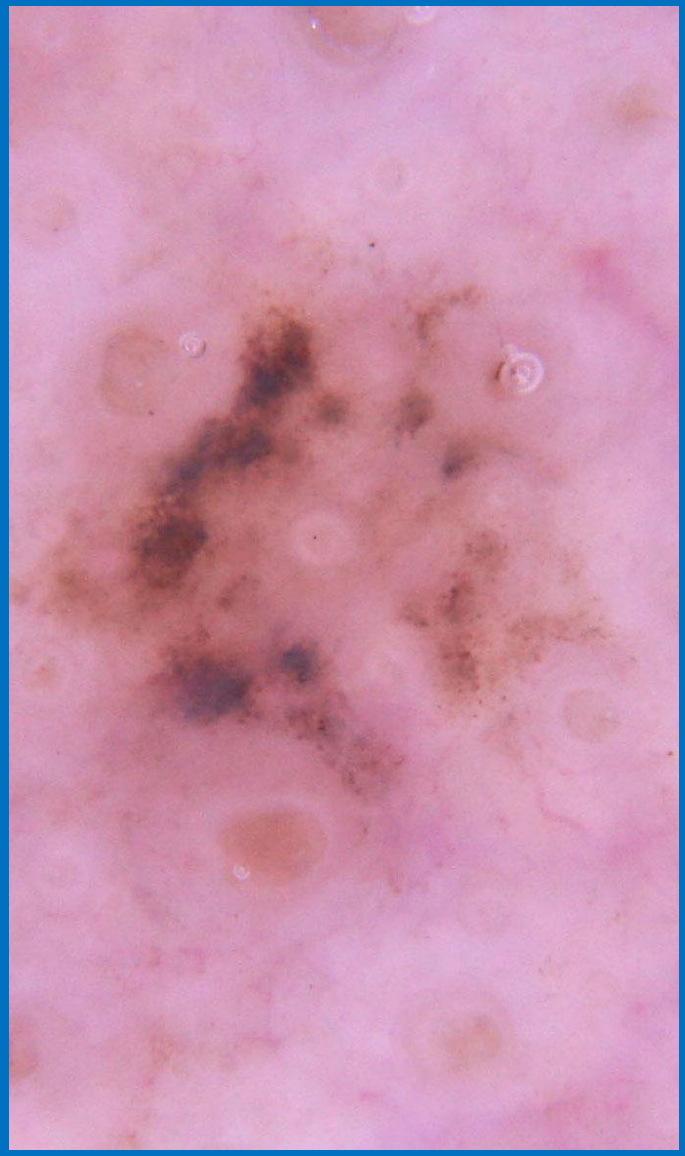
ABSTRACT

We present a case report of a naevoid lentigo maligna (World Health Organisation level 1 melanoma) on the nose of a 46-year-old man. He was under surveillance because of a past history of two melanomas and developed a new lesion. The visible lesion was 1.6 mm in maximum diameter as measured by the scale on the dermatoscope footplate. The dermatoscopic structures present were limited to dots arranged asymmetrically. We believe that the fact that some of these dots were grey provided a useful clue to the diagnosis of melanoma.

Key words: Dermatoscopy, lentigo maligna, melanoma, naevoid, small.

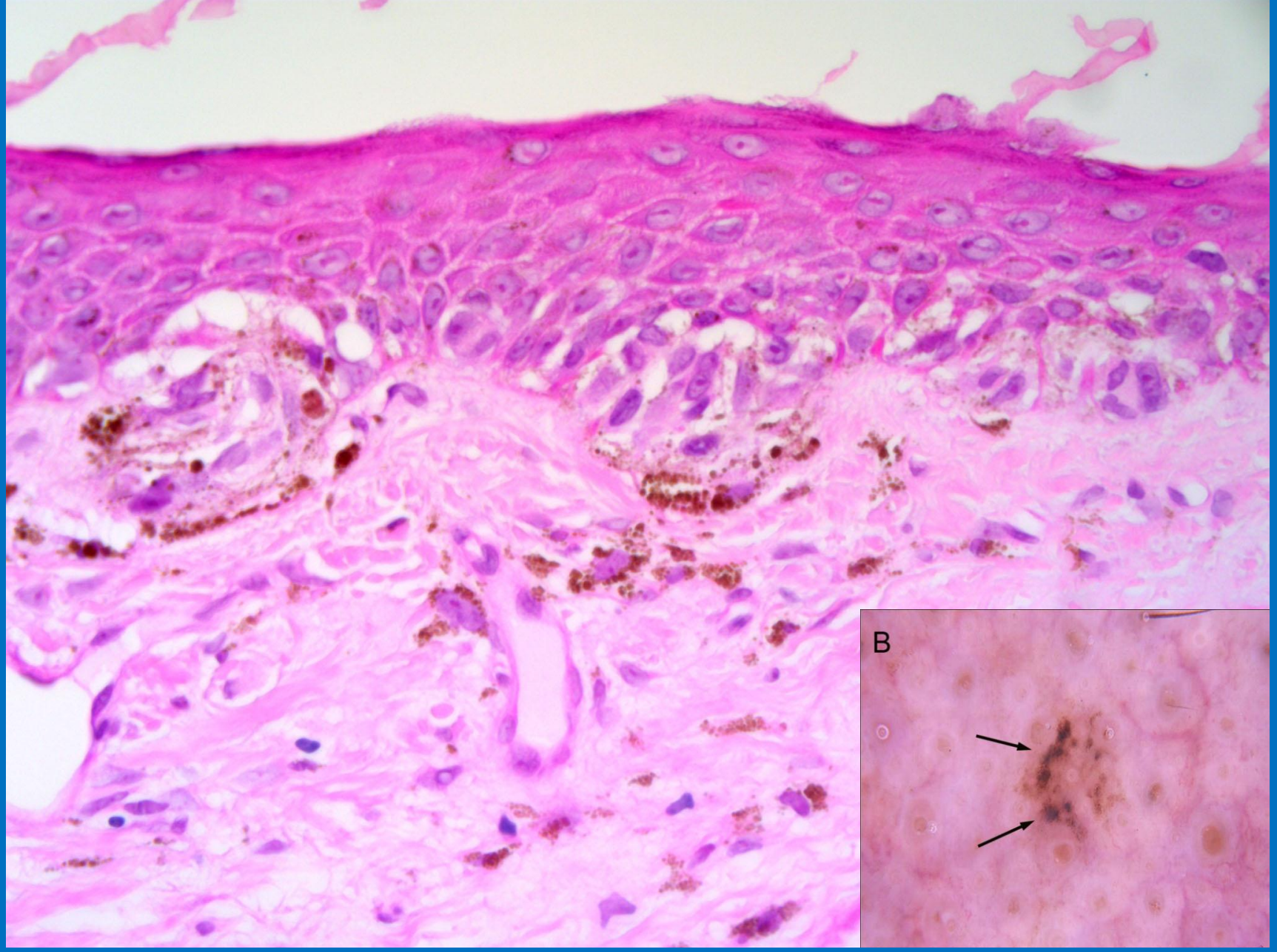
The lesion was examined with a Heine delta 20 (non-polarising) dermatoscope (Heine, Herrsching, Germany) and photographs were taken with a Dermlite Fluid (non-polarising) dermatoscope (3Gen LLC, San Juan, CA, USA) coupled to a Canon Single lens reflex 400D camera (Canon, Tokyo, Japan). Both of these dermatoscopes produce 10× magnification.

Dermatoscopically the maximum diameter of the pigmented lesion was 1.6 mm as measured on the dermatoscope faceplate scale. There were brown and grey dots arranged asymmetrically (Fig. 1b). There were no other structures. This lesion did not reach the diameter threshold for melanoma of 6 mm according to the ABCD (asymmetry, border irregularity, colour variegation, diameter greater than 6mm) acronym,[1] but it is now known that 11.4 to 38.2% of diagnosed melanomas are less than 6 mm in diameter.[2] Blue or grey structures are a clue to malignancy dermatoscopically because they are found in melanoma,[3] pigmented



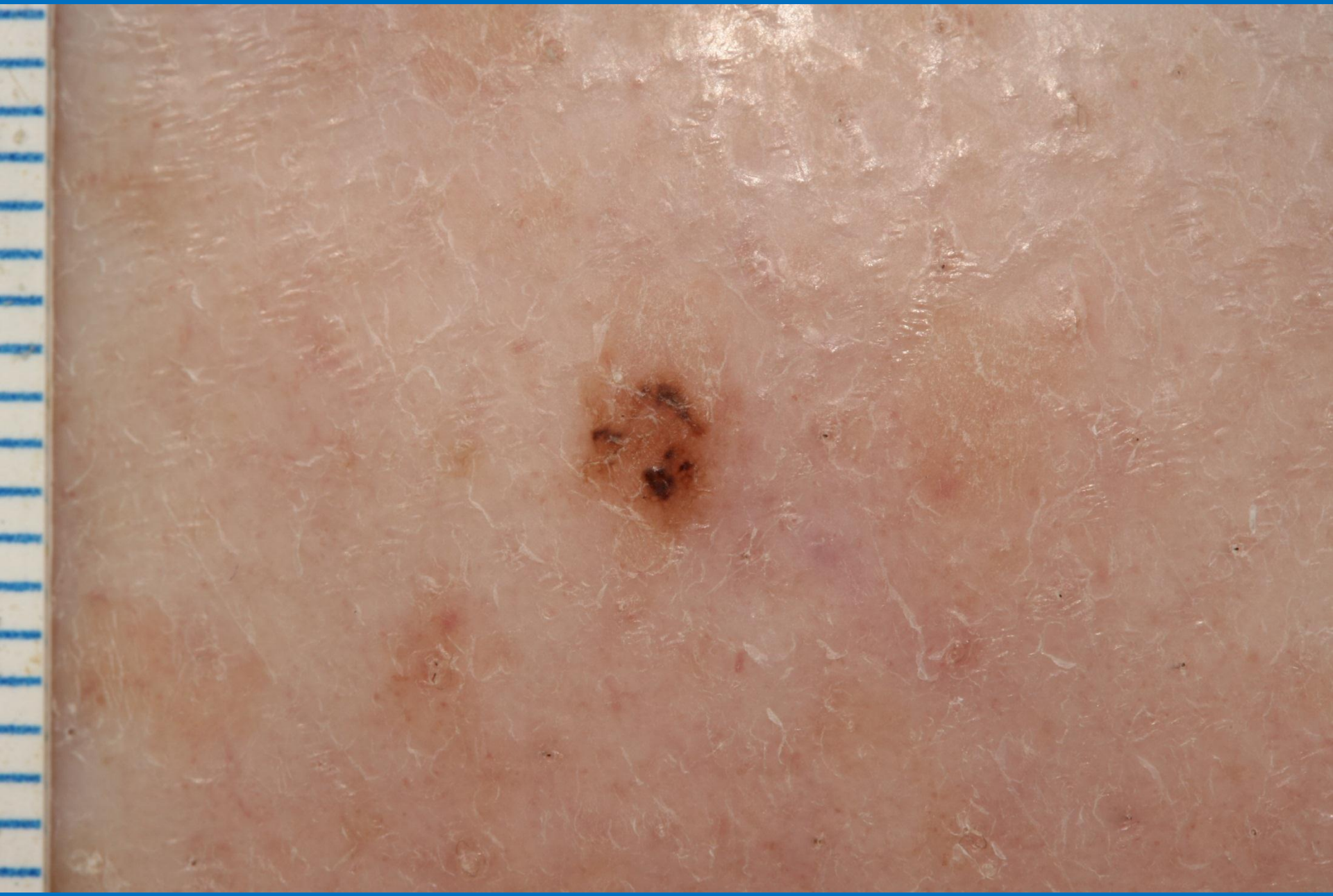
The smallest published melanoma with dermatoscopy. In retrospect it can be diagnosed as suspicious for malignancy by Chaos and Clues.

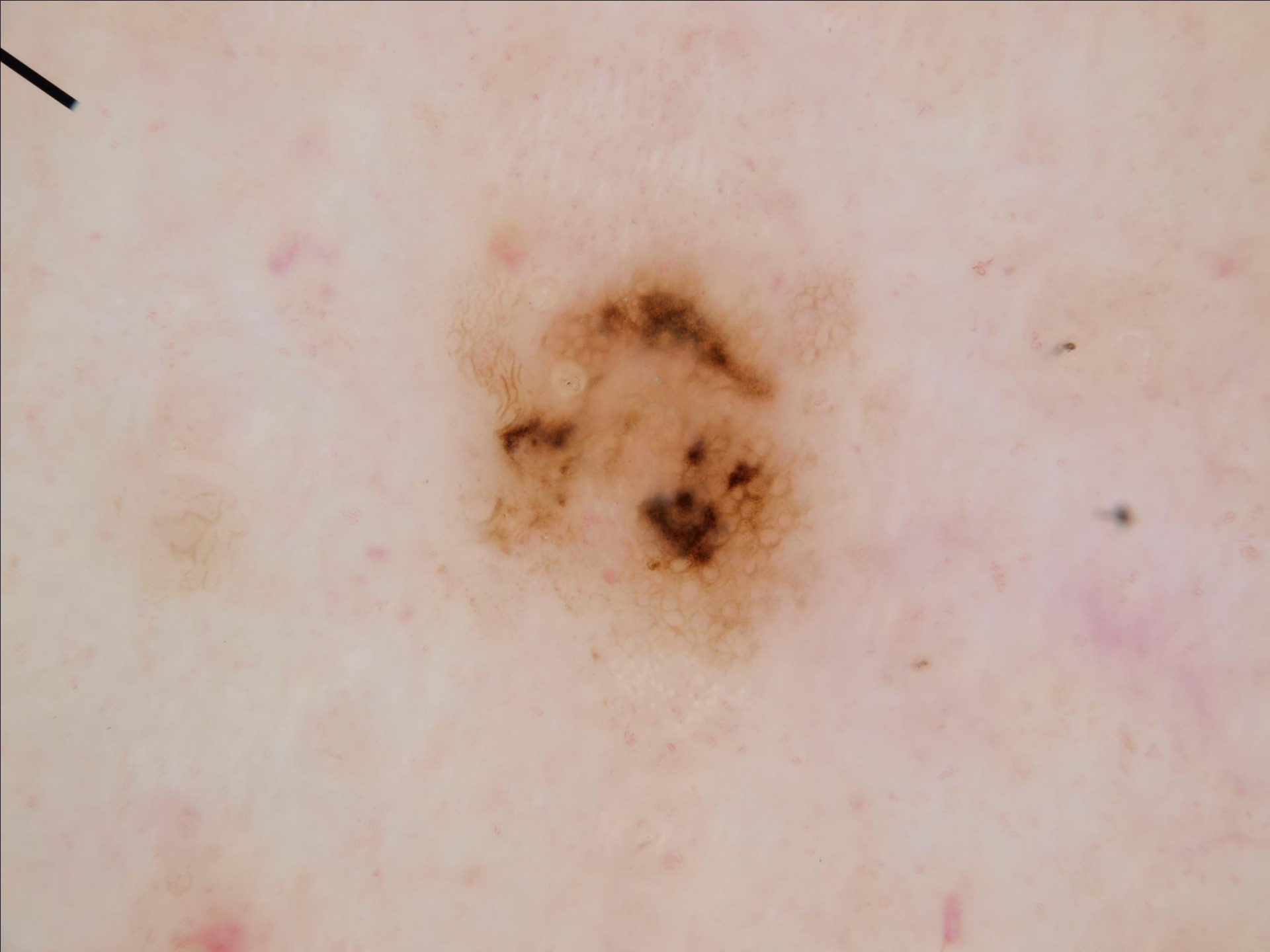
[20]

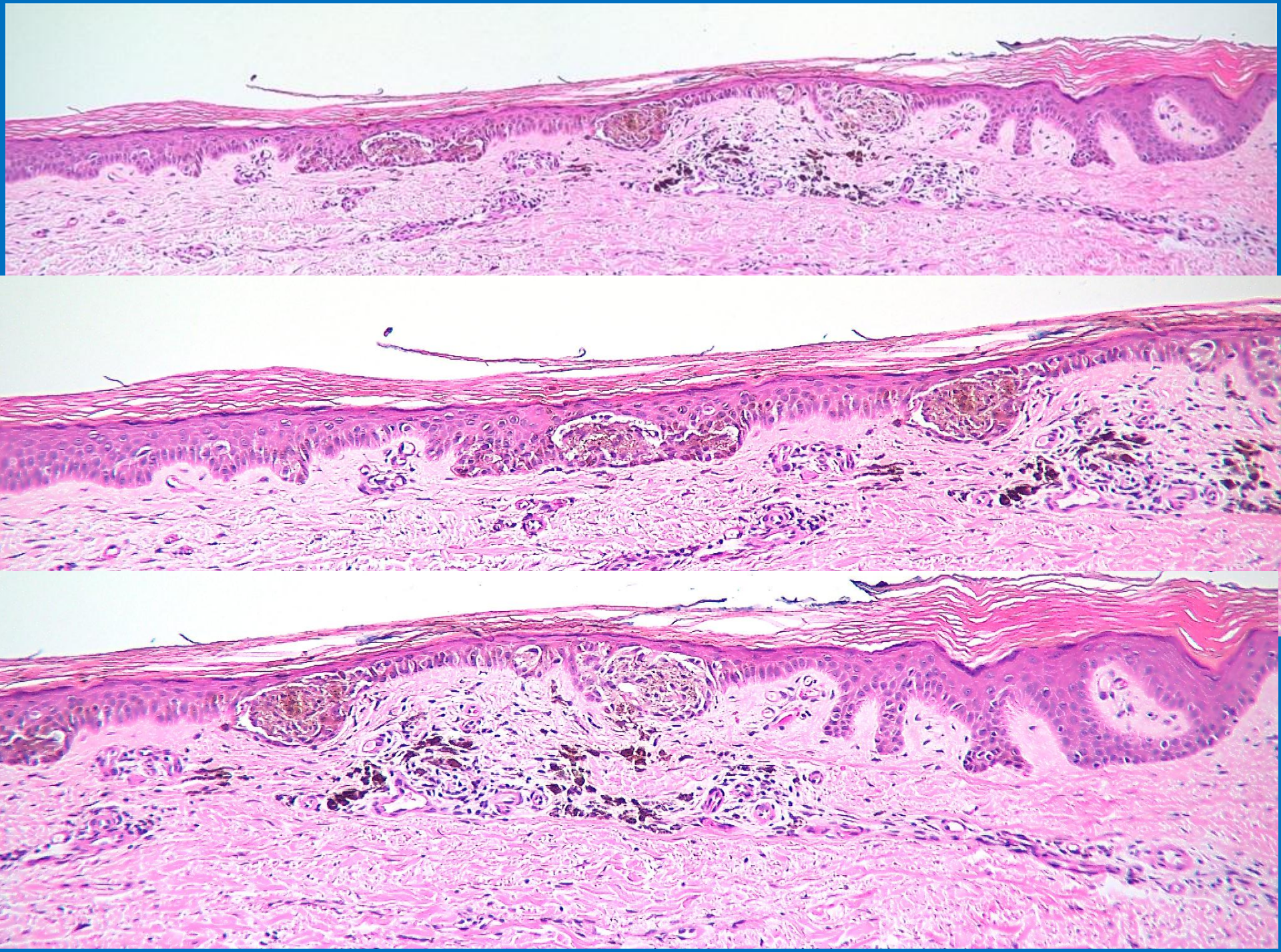


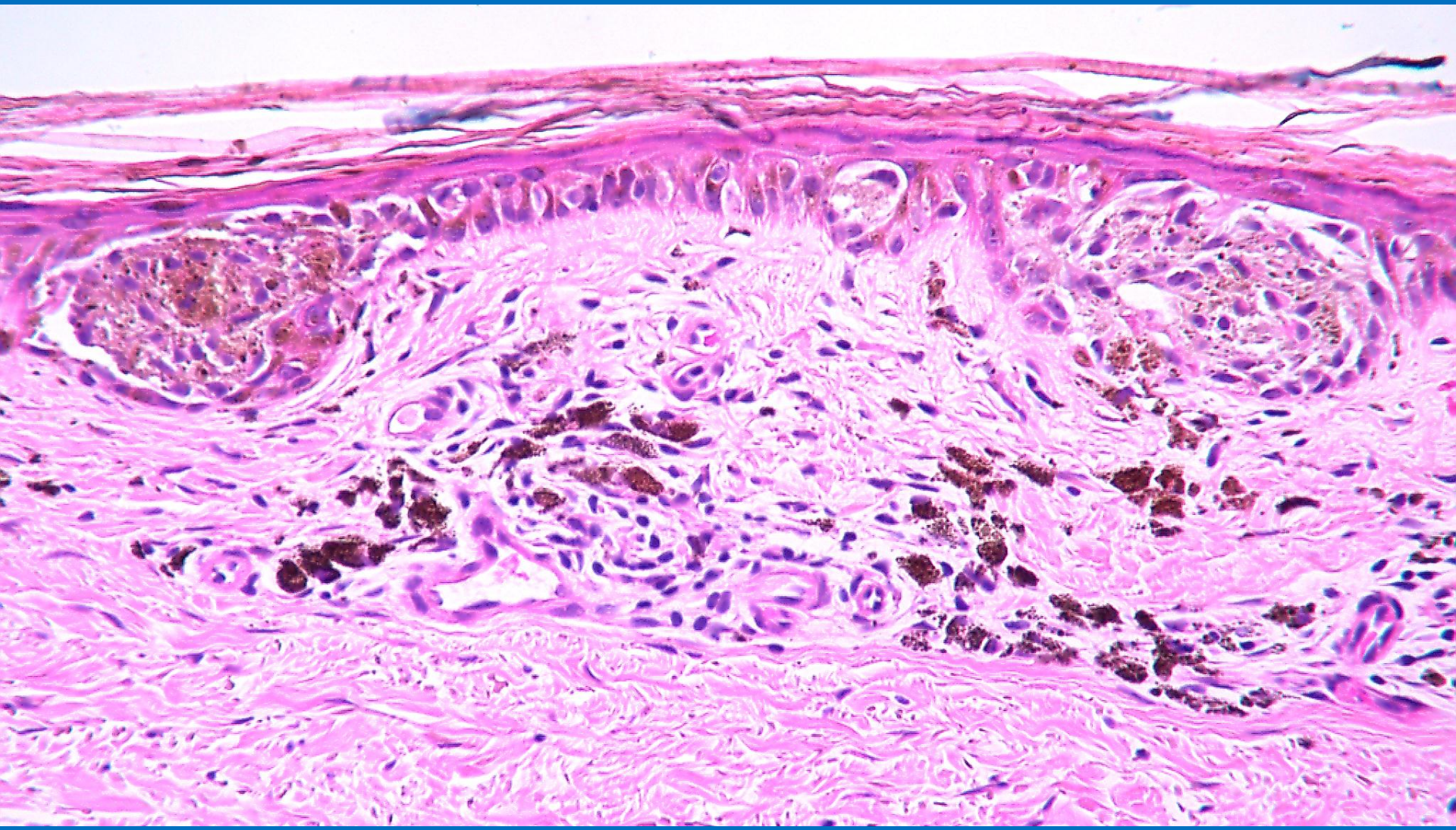
Grey dots in this in-situ melanoma correlate with melanin incontinence

56 year old lady. Her 31 year-old sister died with metastatic melanoma.

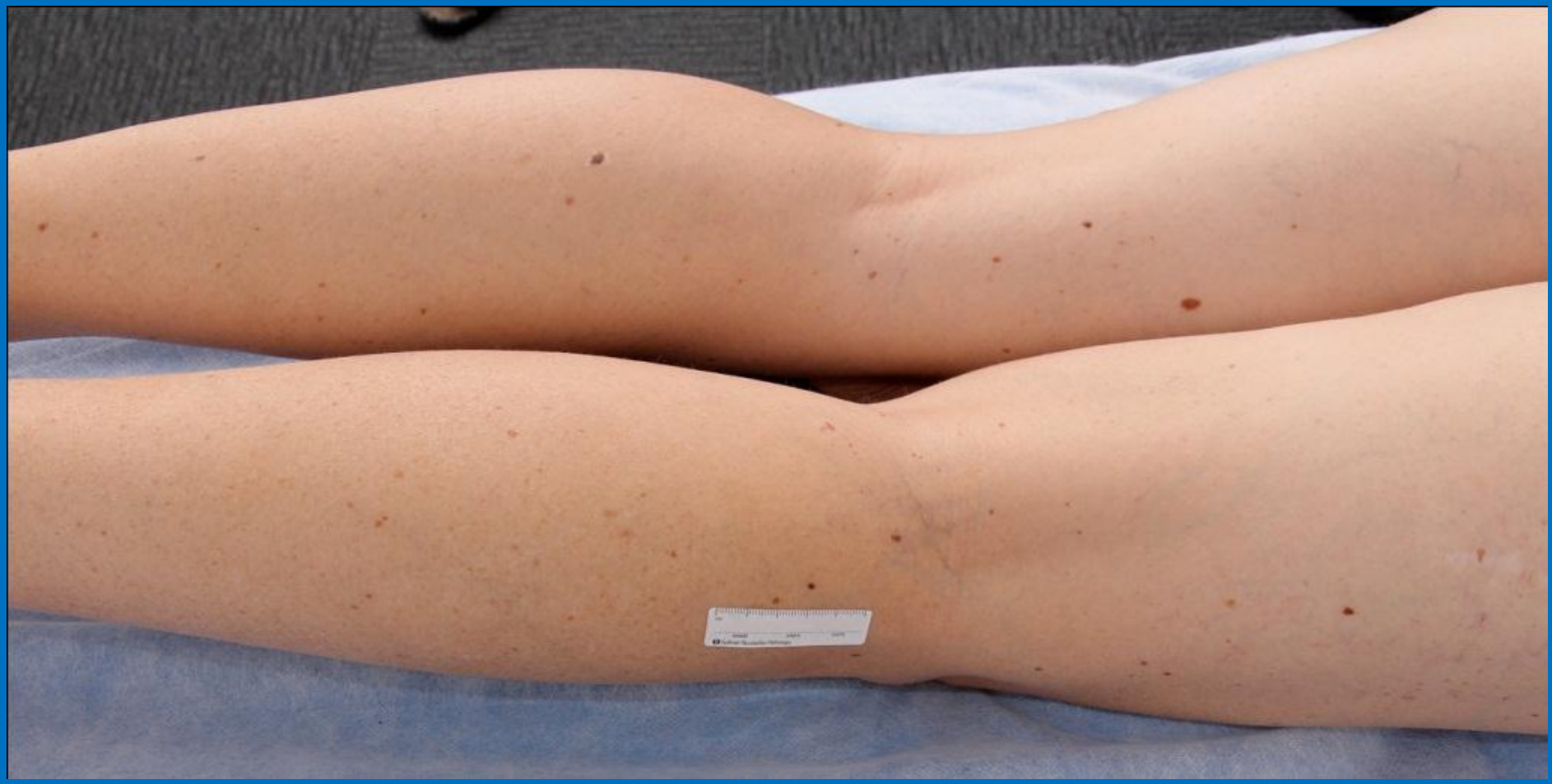








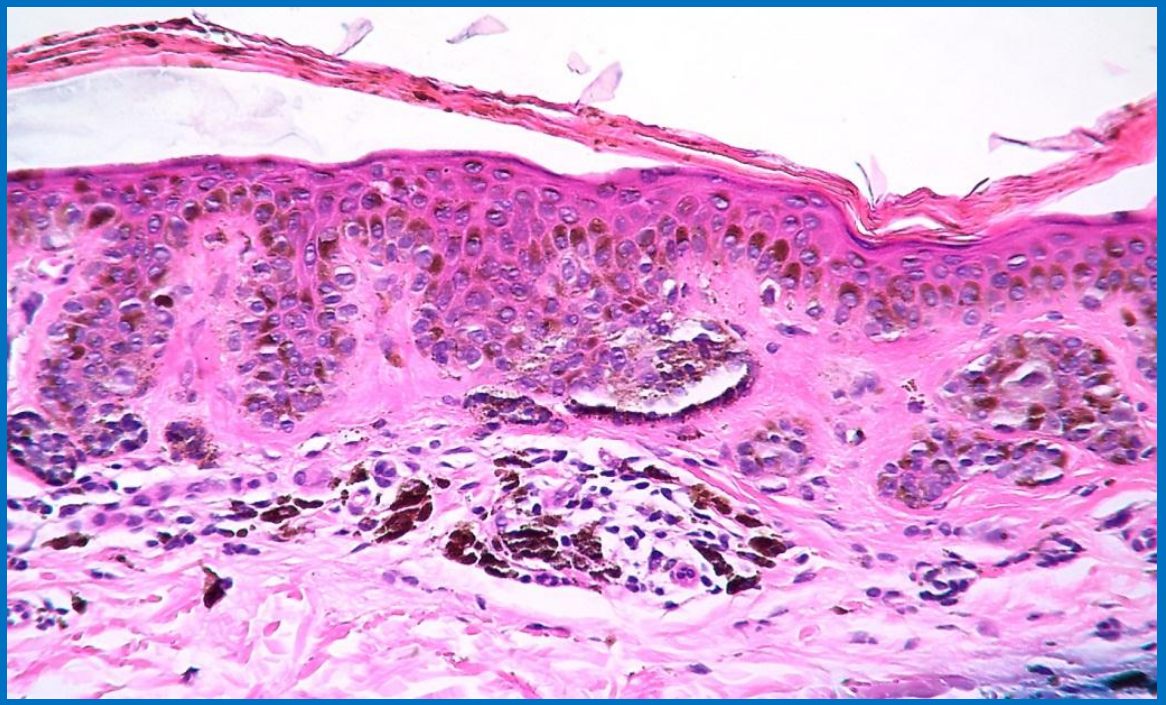
In-situ melanoma. Melanin incontinence correlates with dermatoscopic grey dots

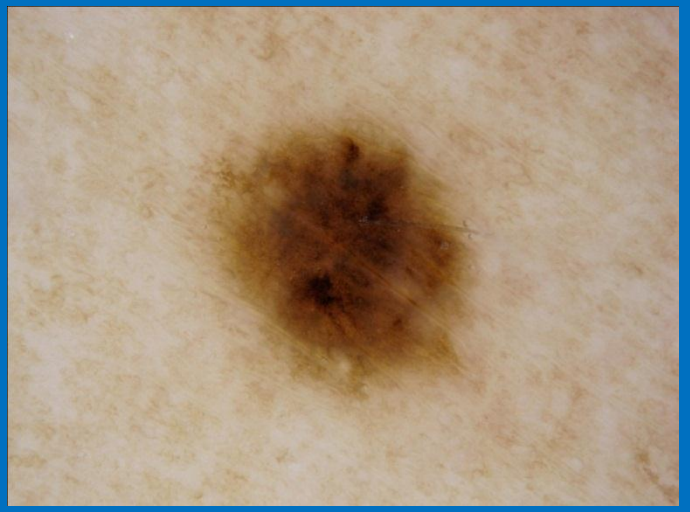


36 year old lady

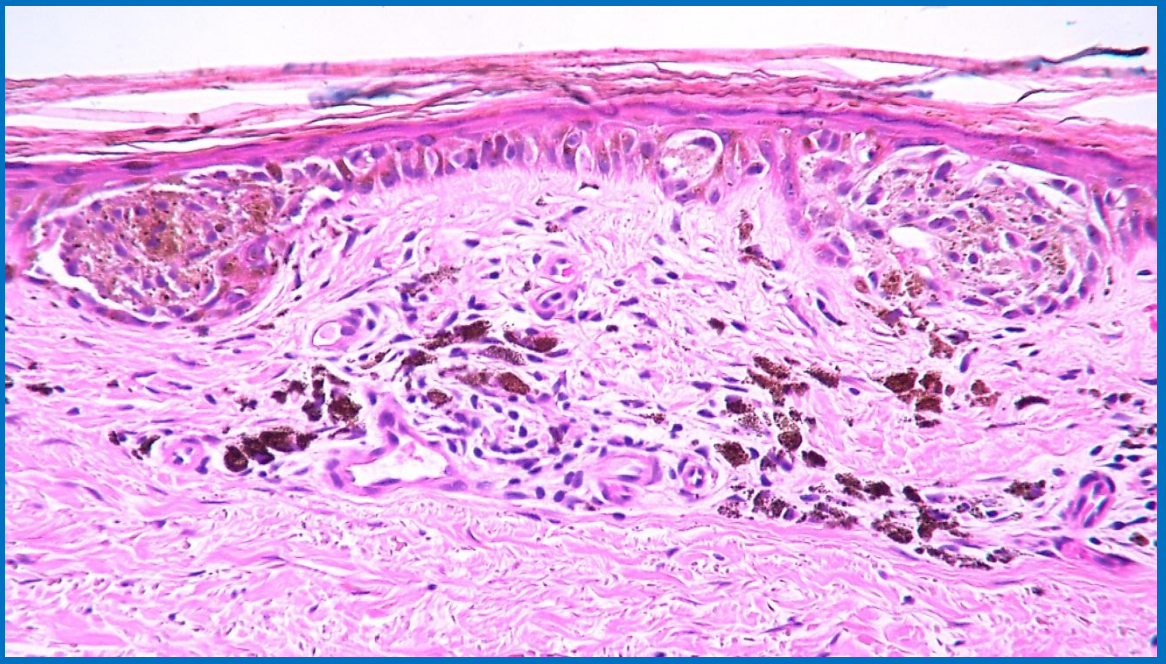
Image courtesy Alan Cameron

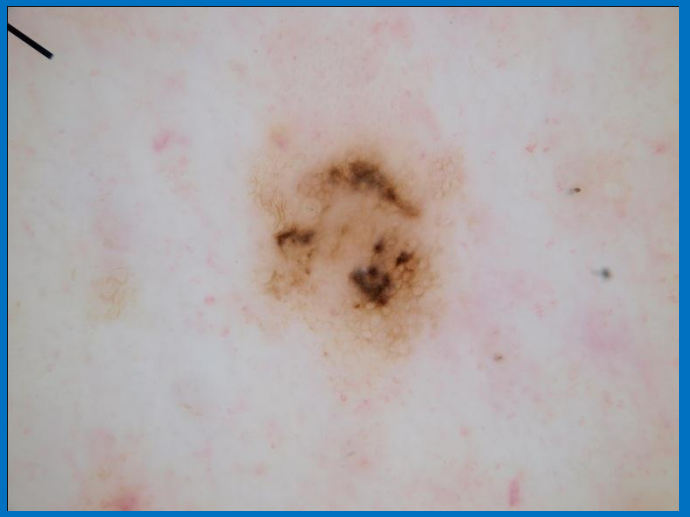
Junctional lentiginous naevi – the most common form of Clark naevus



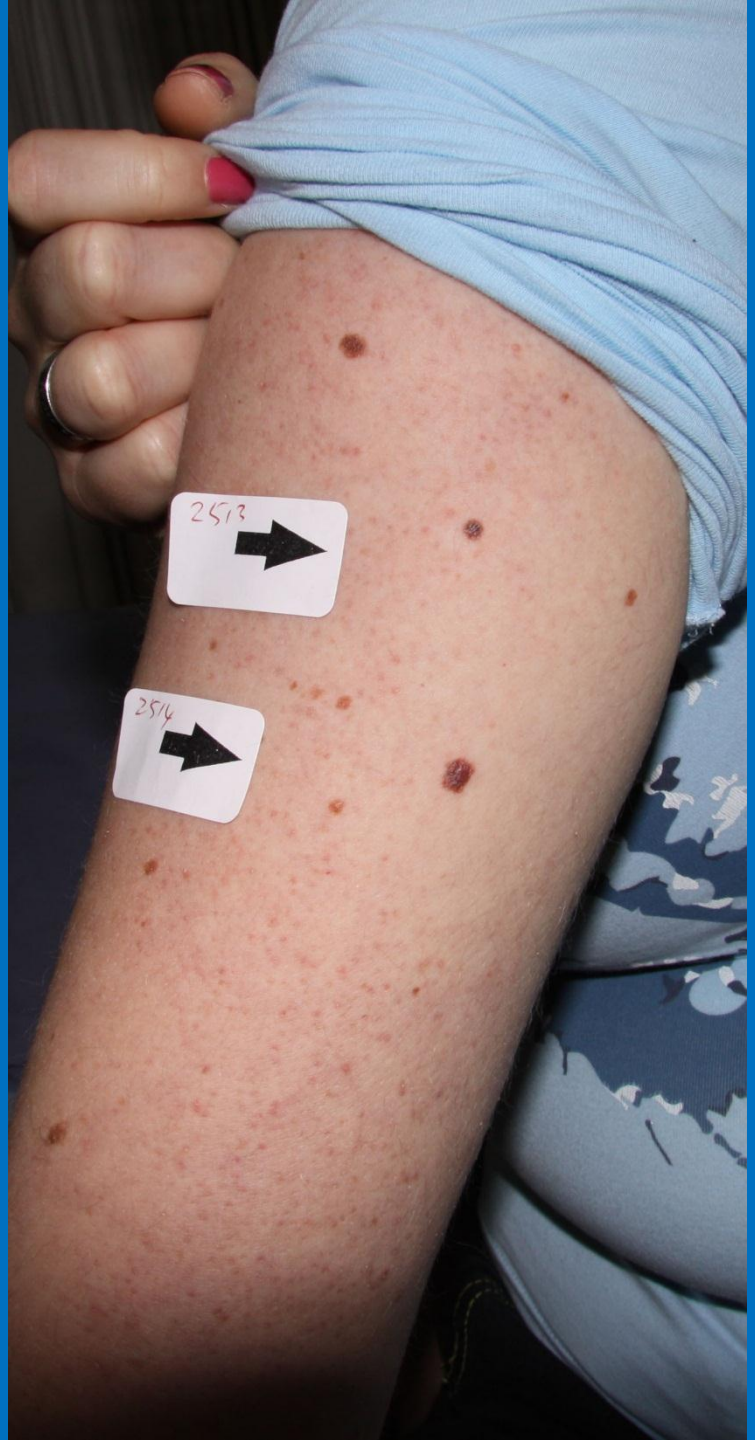


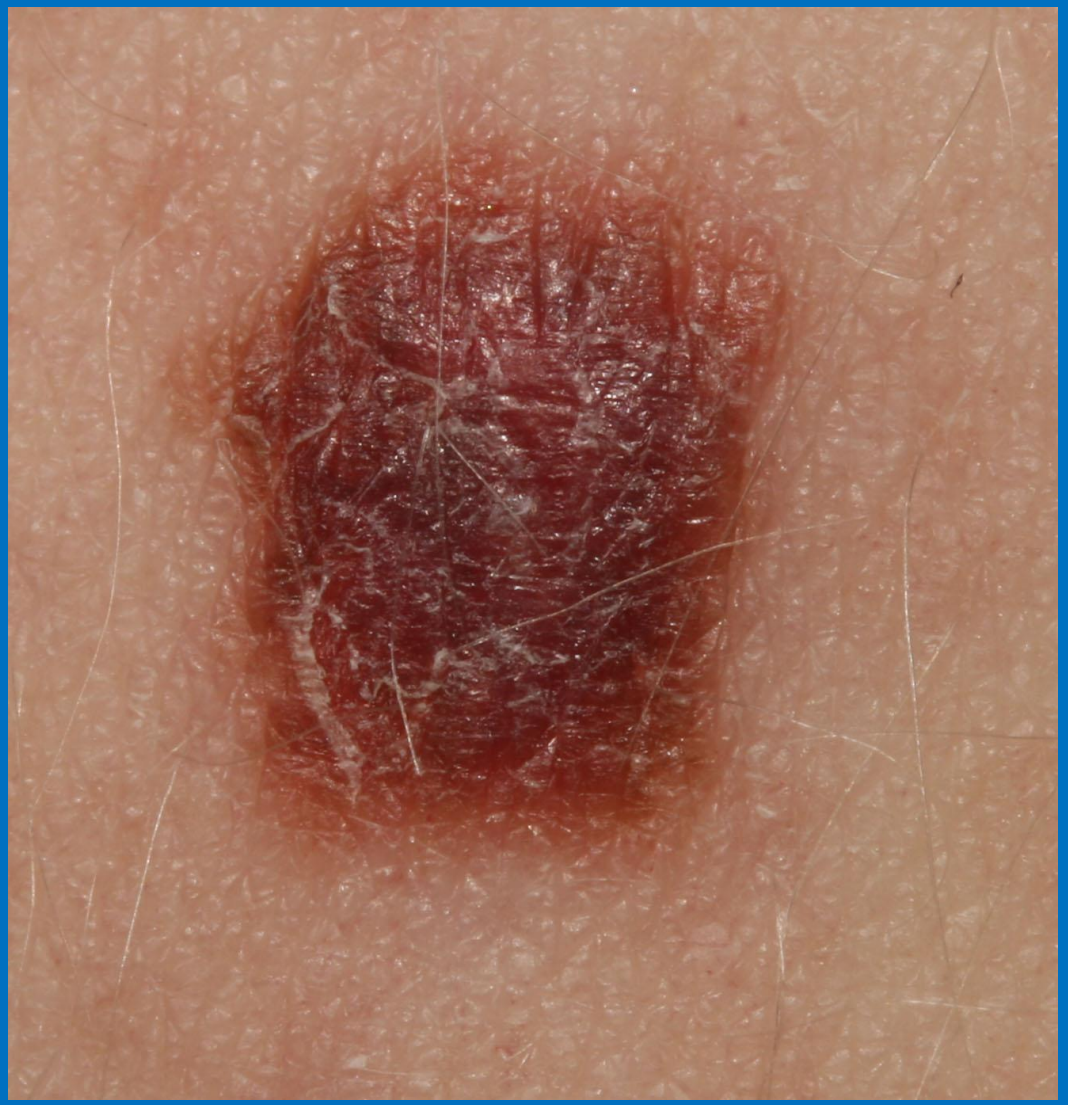
junctional lentiginous naevus





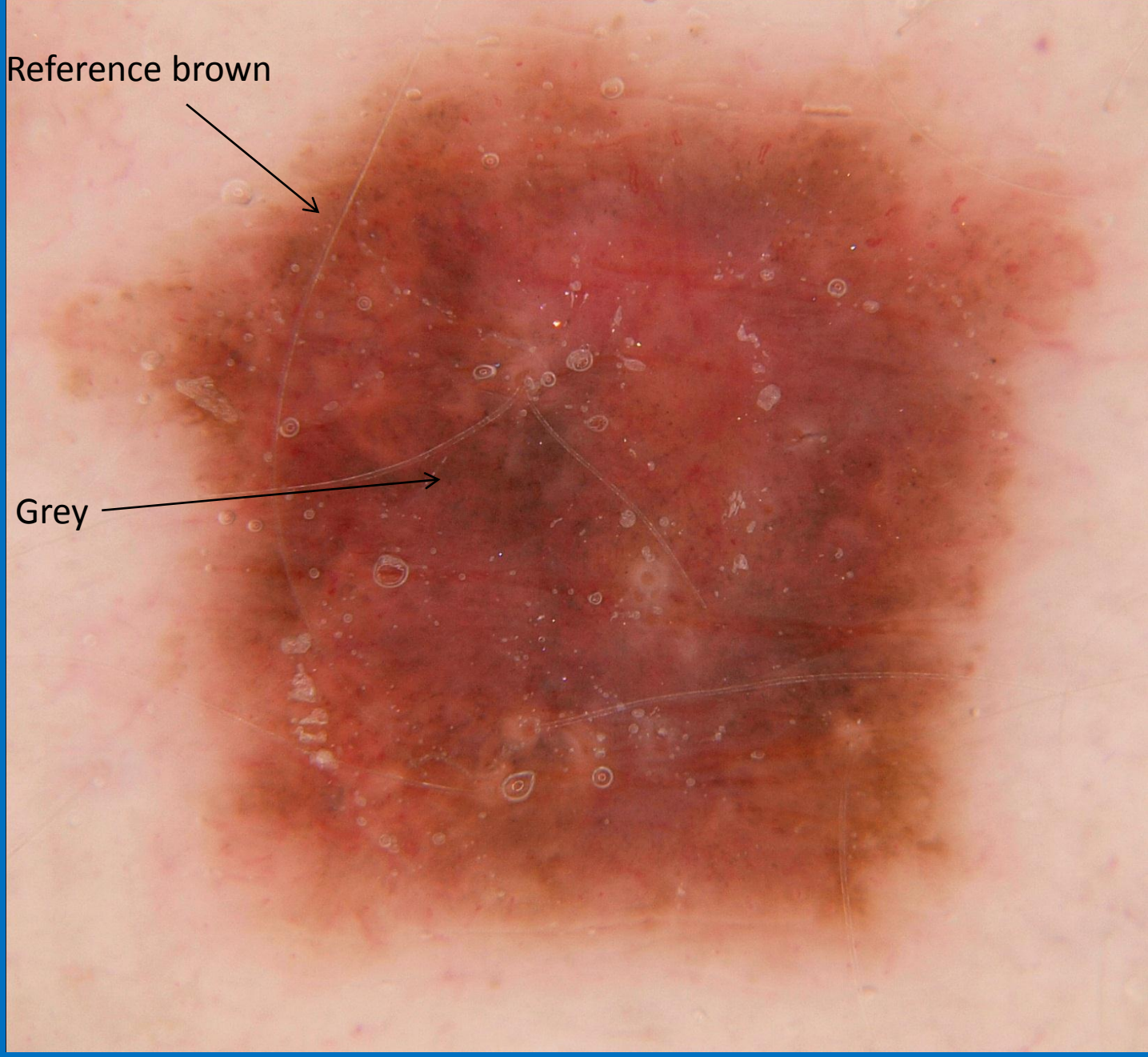
Melanoma



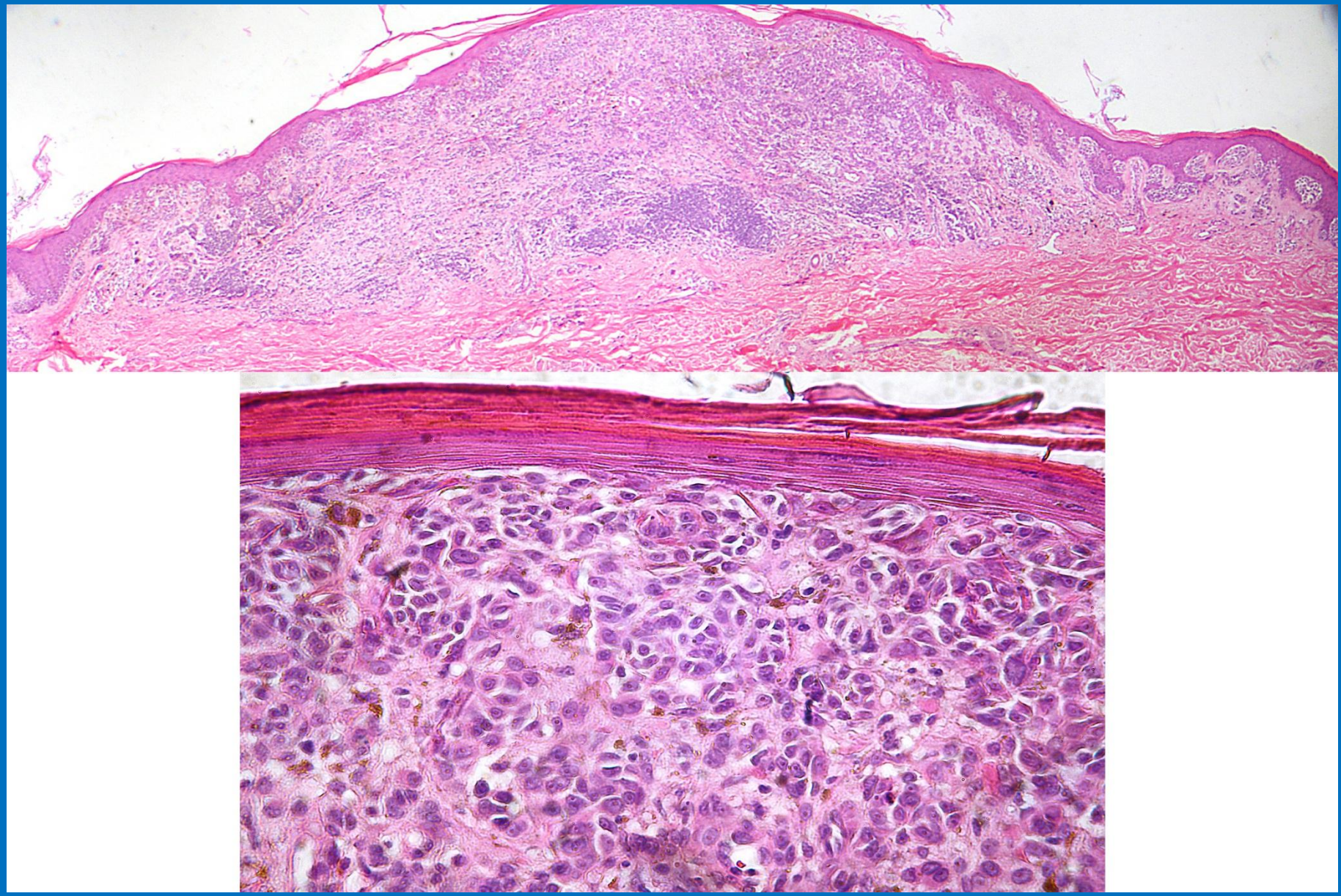


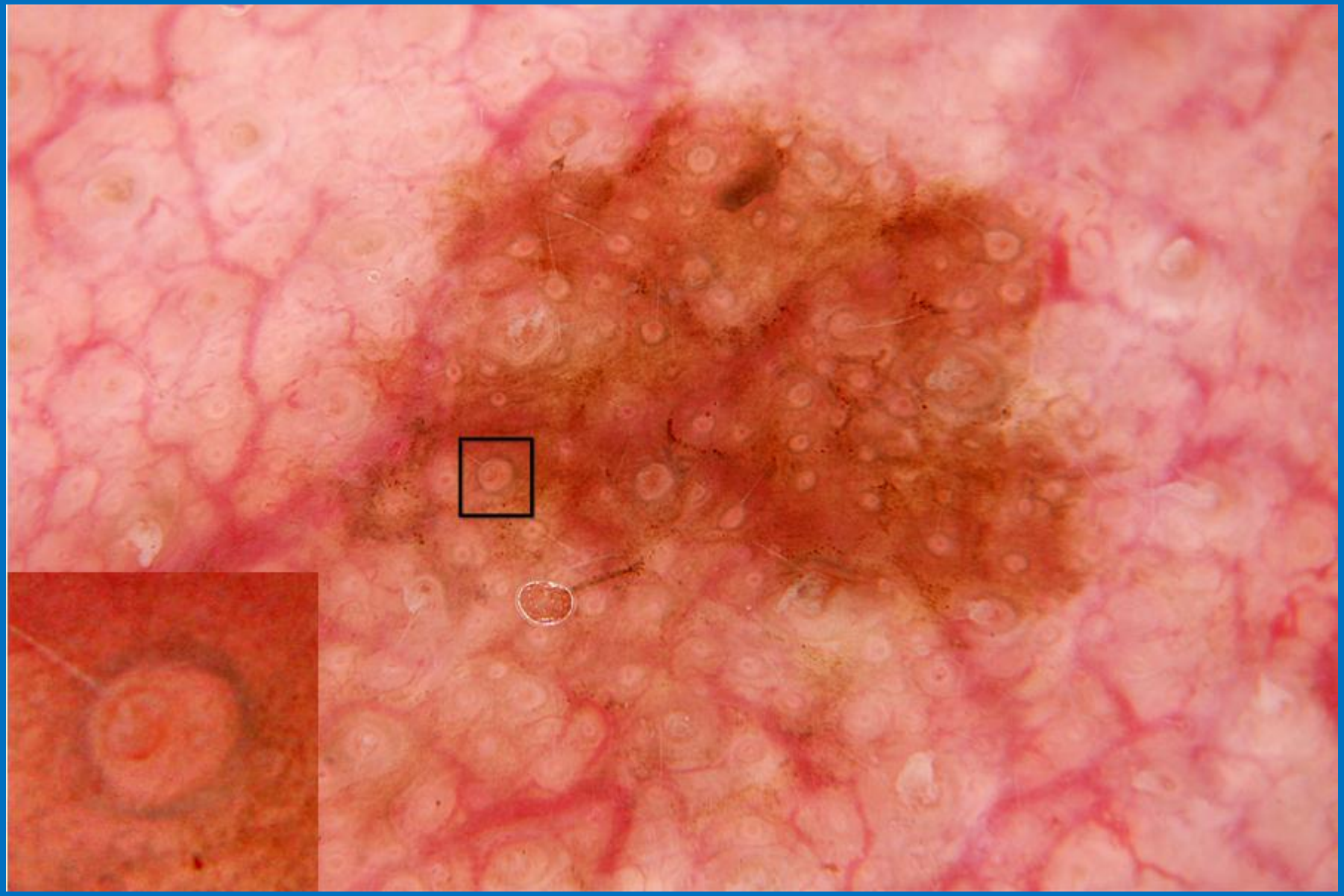
Note the rectangular shape. This breaks the pattern clinically

Every pigmented melanocytic lesion will contain some brown colour. It can be used as a reference to identify grey

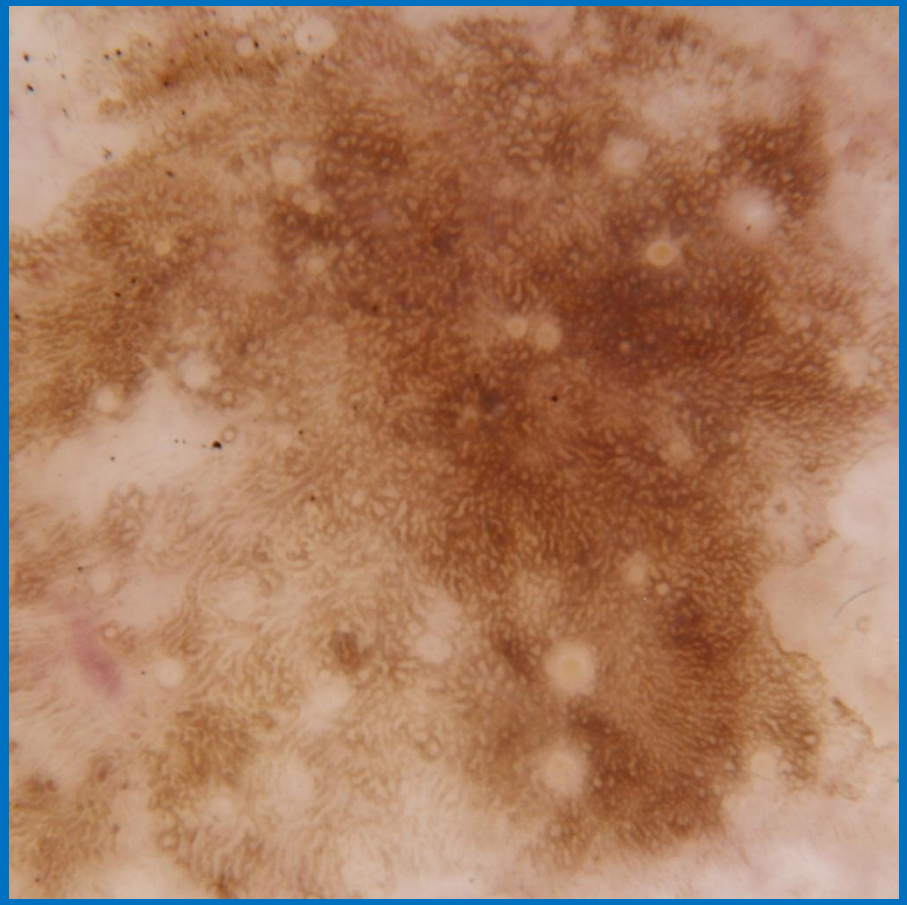


Invasive melanoma (Breslow 1.2mm) in a 27 year-old lady





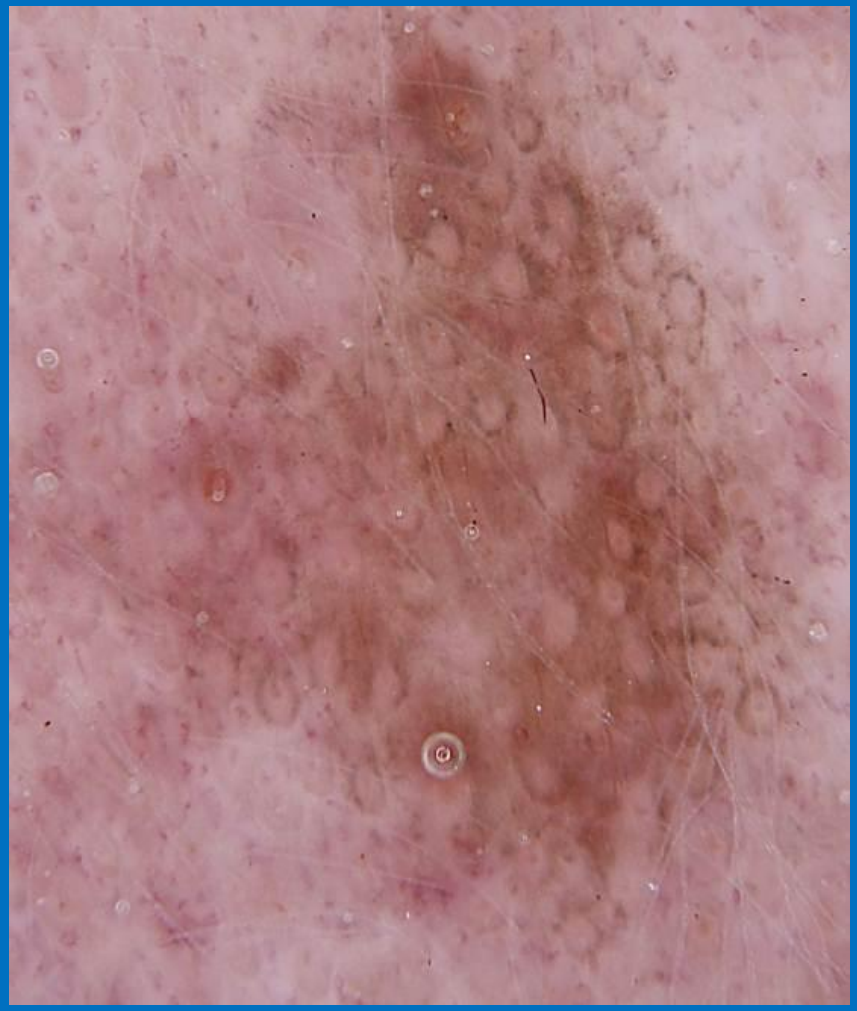
Pigmented circles on the face are a clue to lentigo maligna. Such circles are commonly grey



Not circles

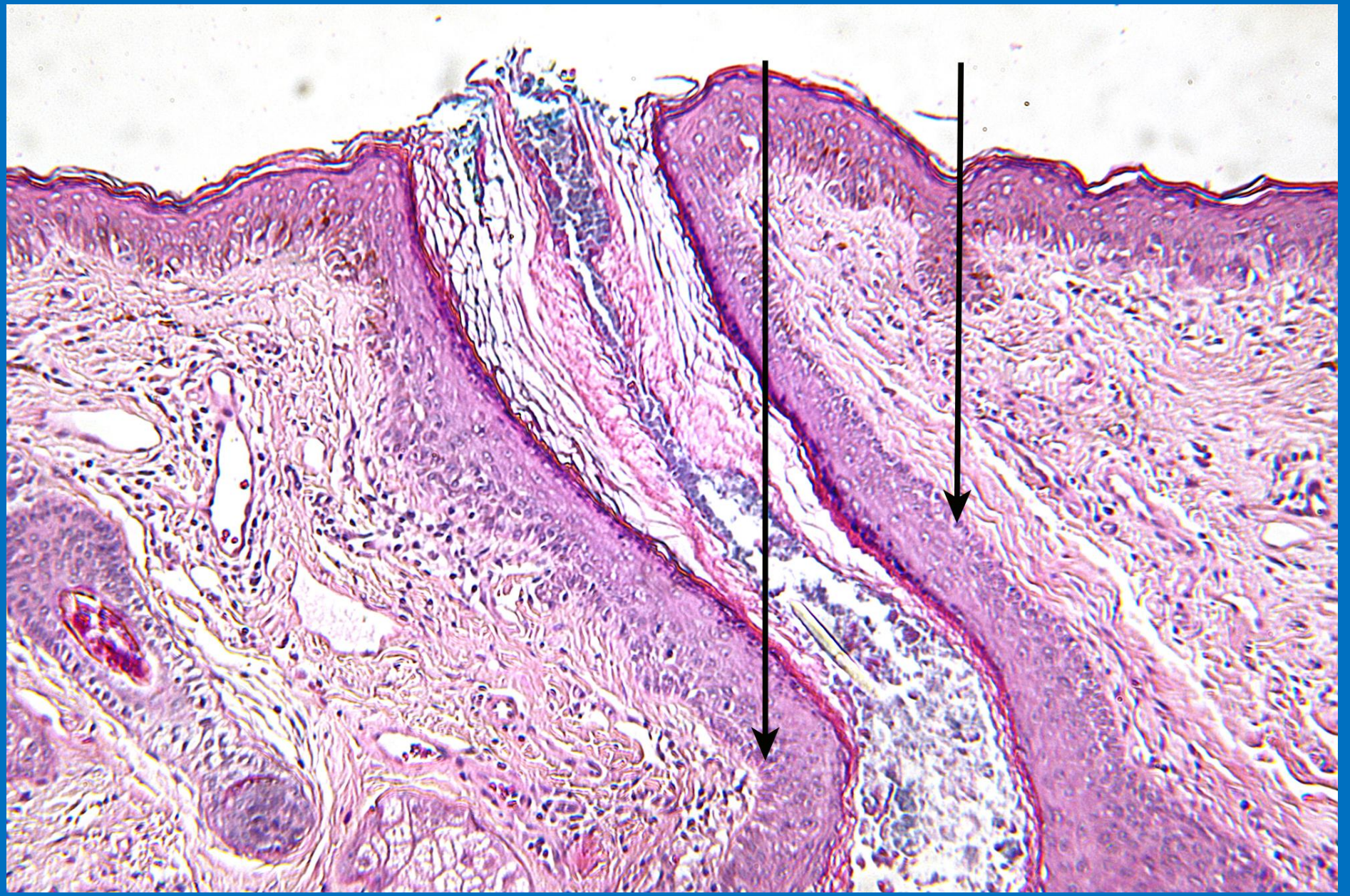
Pattern of lines reticular interrupted by follicular openings in a solar lentigo

Circles must be formed of a curved **line** equidistant from a central point



Circles

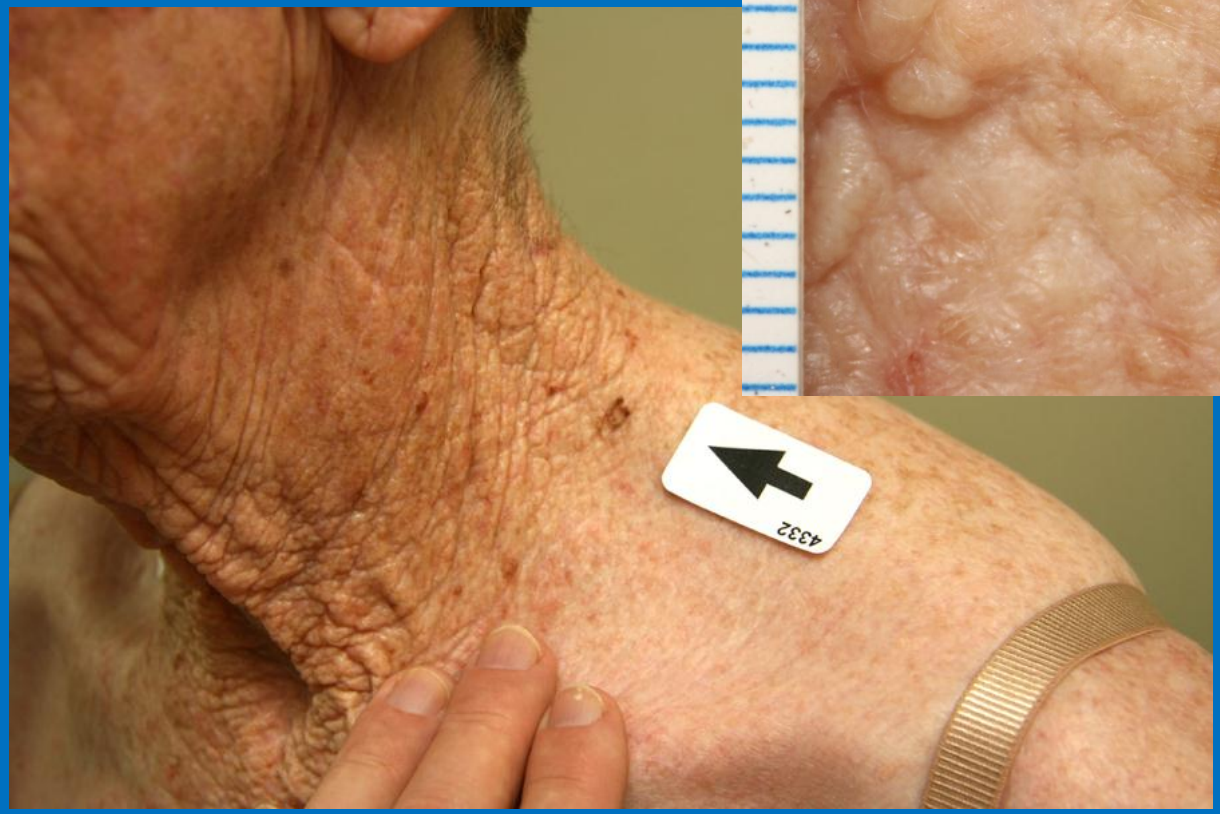
Pattern of circles in an in-situ melanoma on the ear lobe



Because the follicle is oblique light passes through dermis between pigmented malignant melanocytes lining the follicle and the dermatoscope, producing a grey circle.

[21]

What about brown circles?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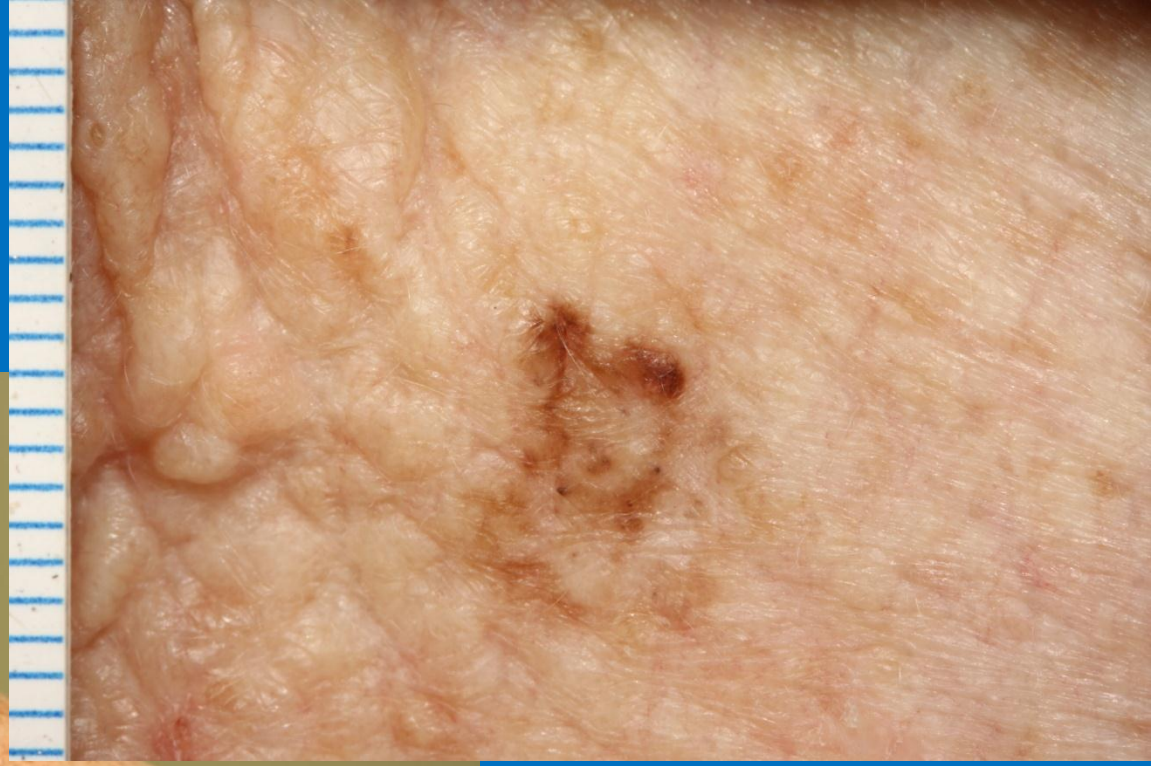
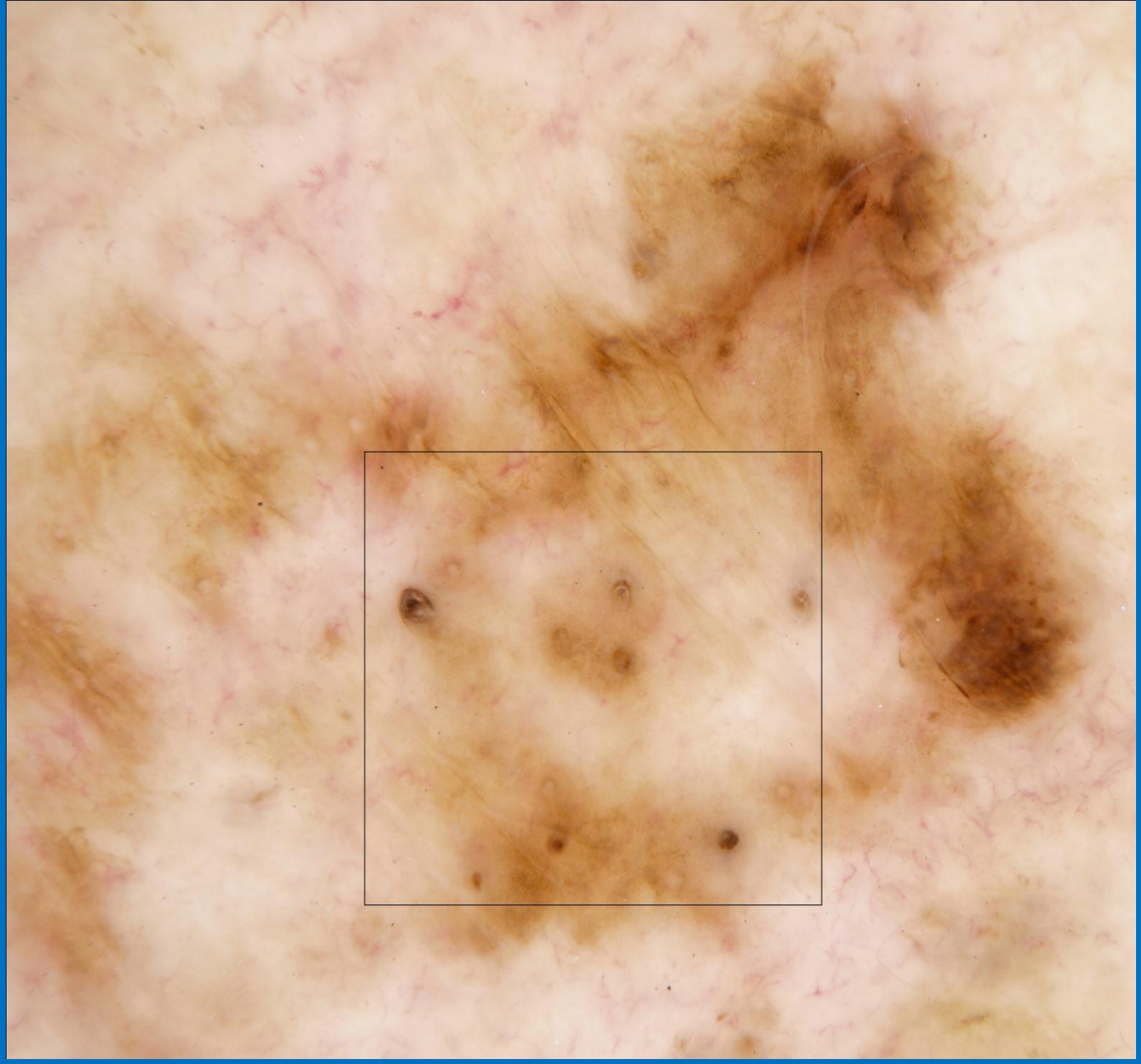
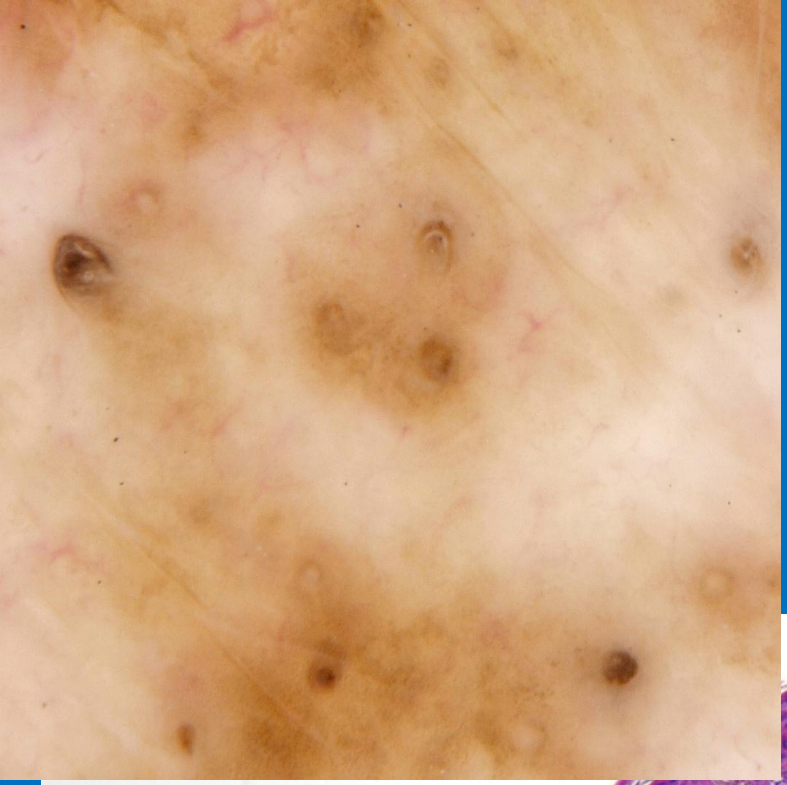
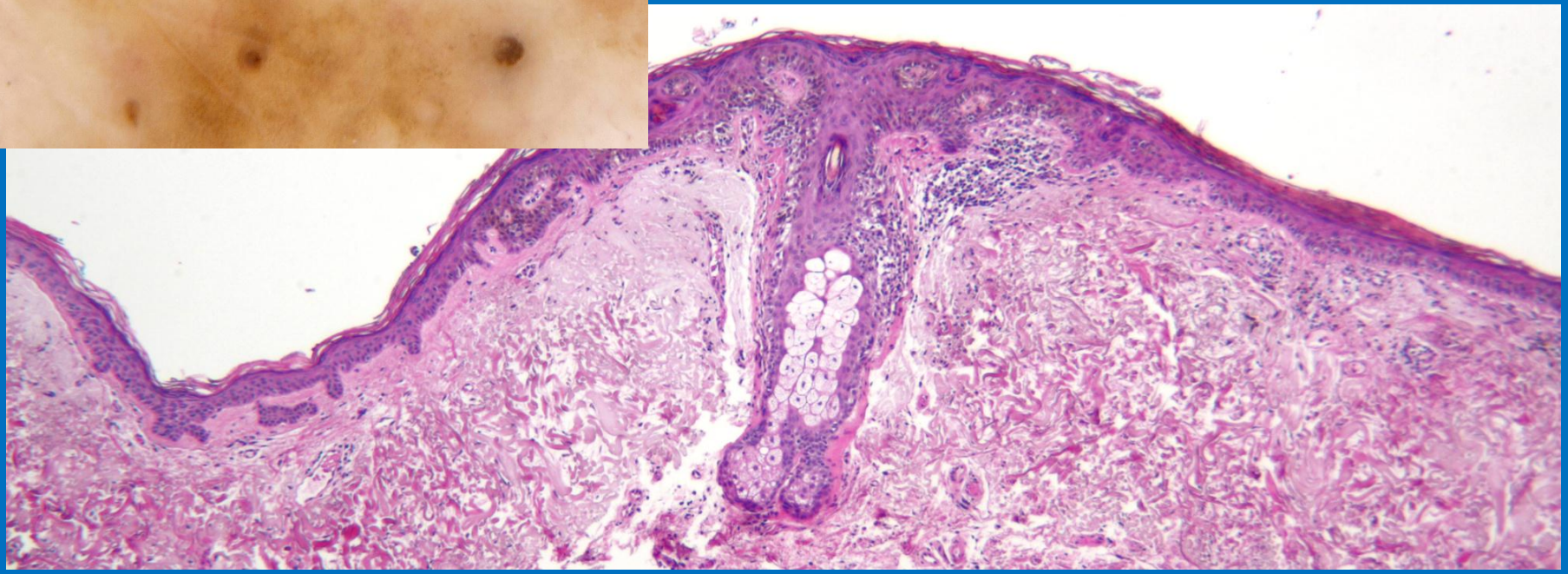


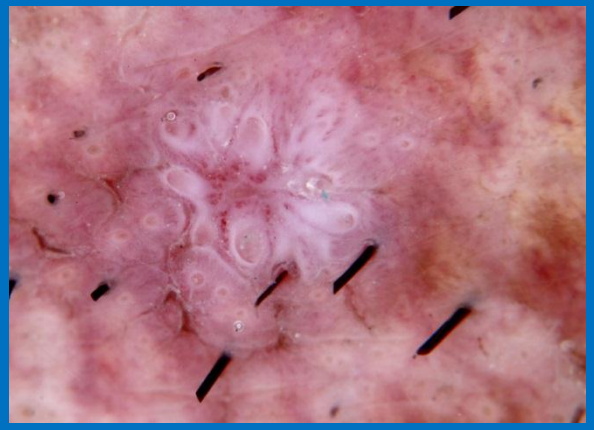


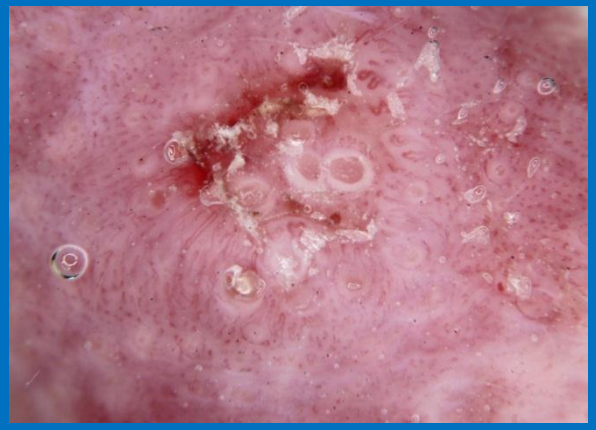
Lentigo maligna



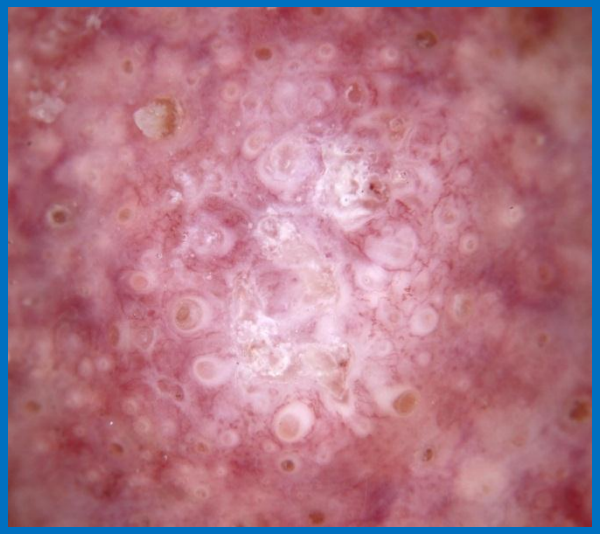


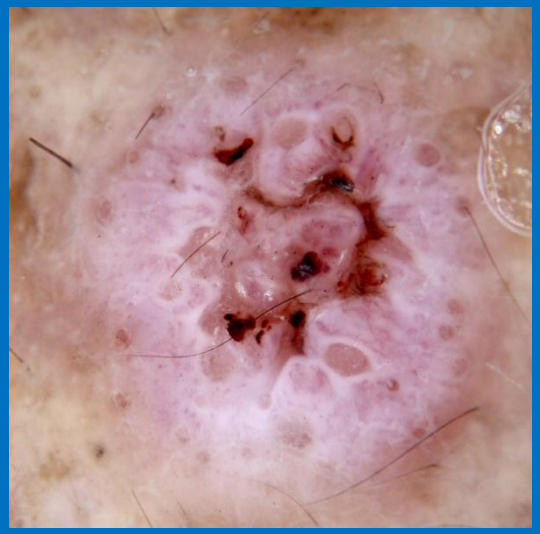
The follicle is perpendicular therefore light passing from pigmented melanocytes lining the follicle to the dermatoscope does not have grey (induced by the Tyndall effect from collagen).

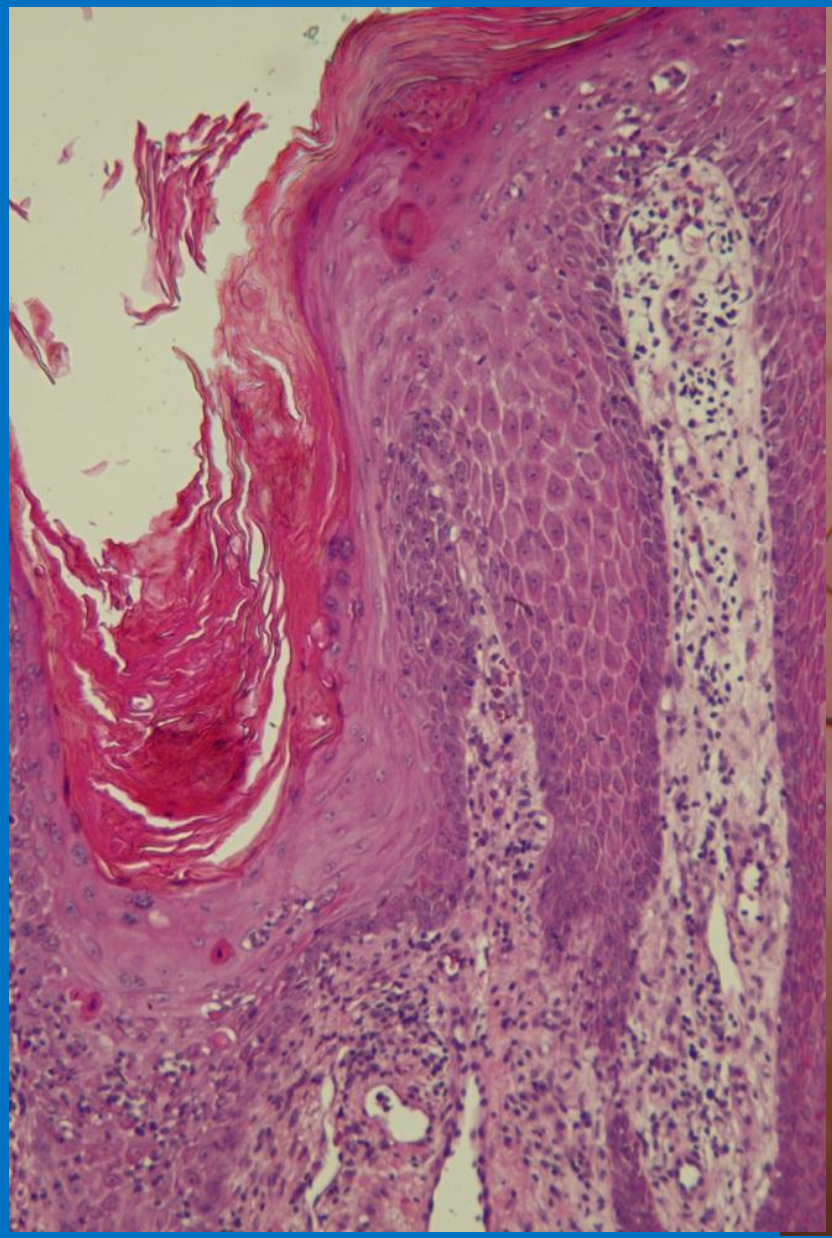


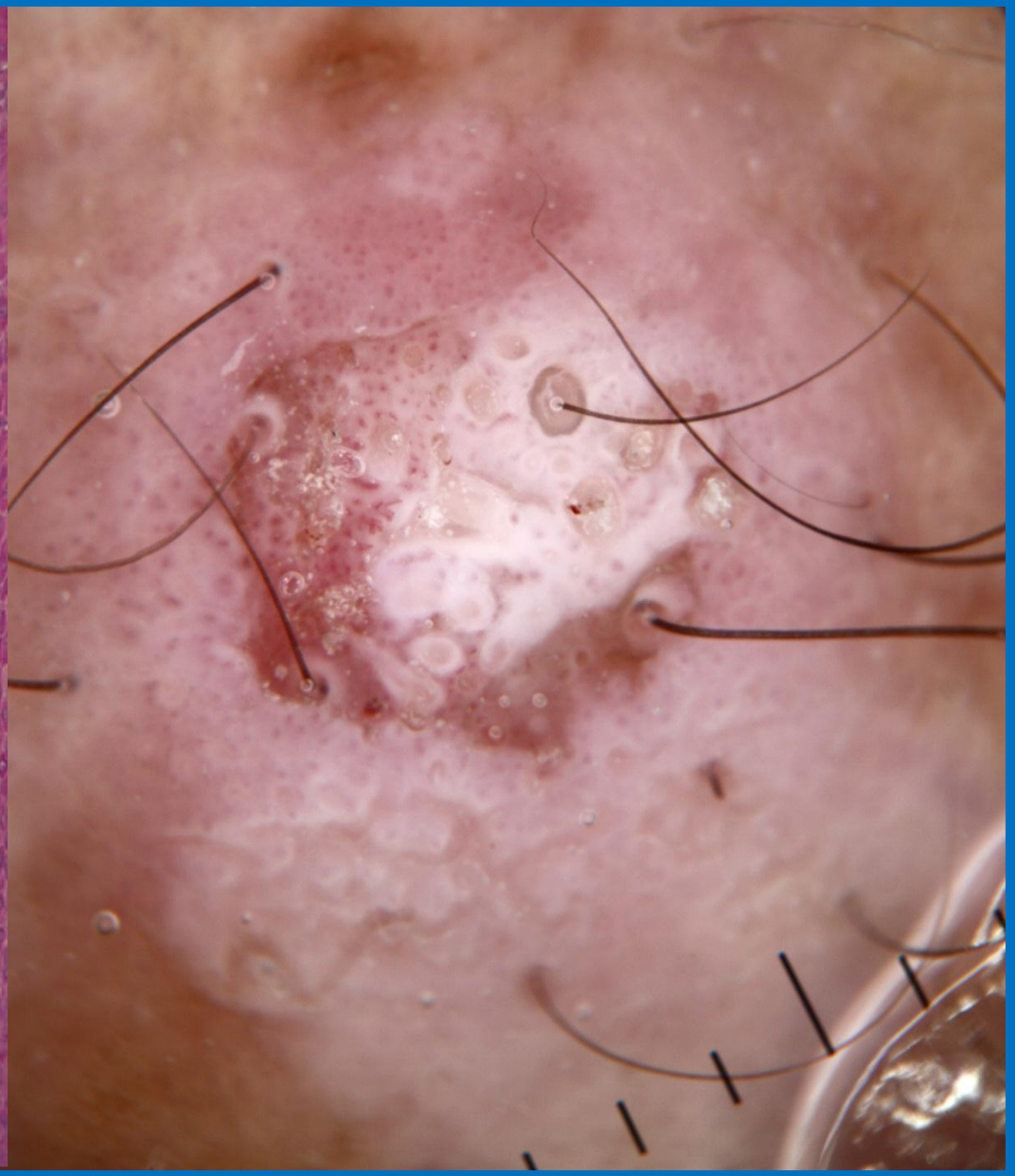


White circles





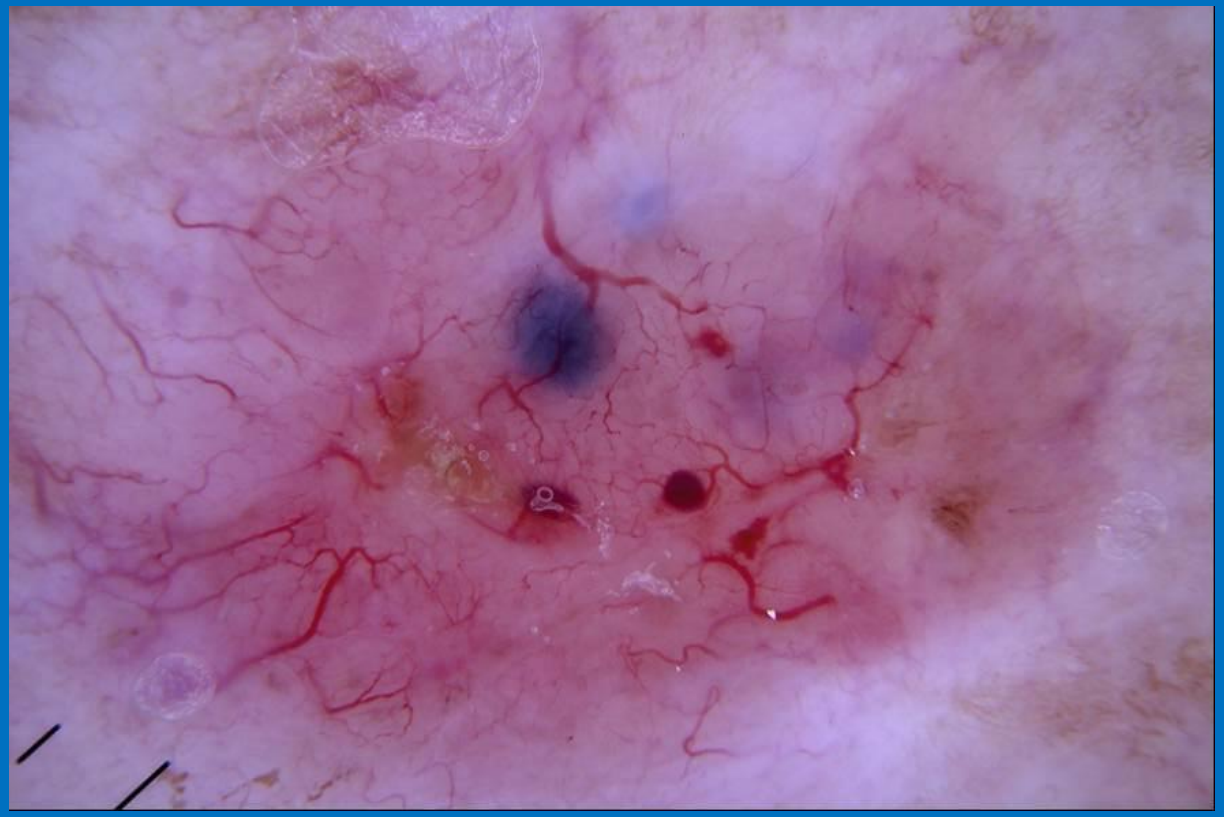


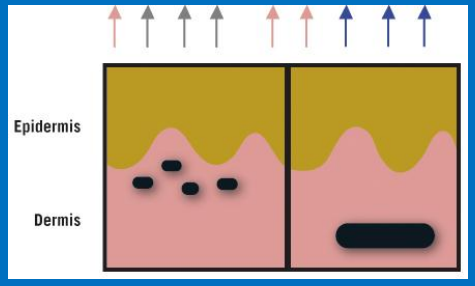


Highly keratinised squamous cells in a well-differentiated SCC invade the follicles producing white circles. This clue in a raised non-pigmented lesion has a sensitivity of 44% and specificity of 87% for SCC/KA.

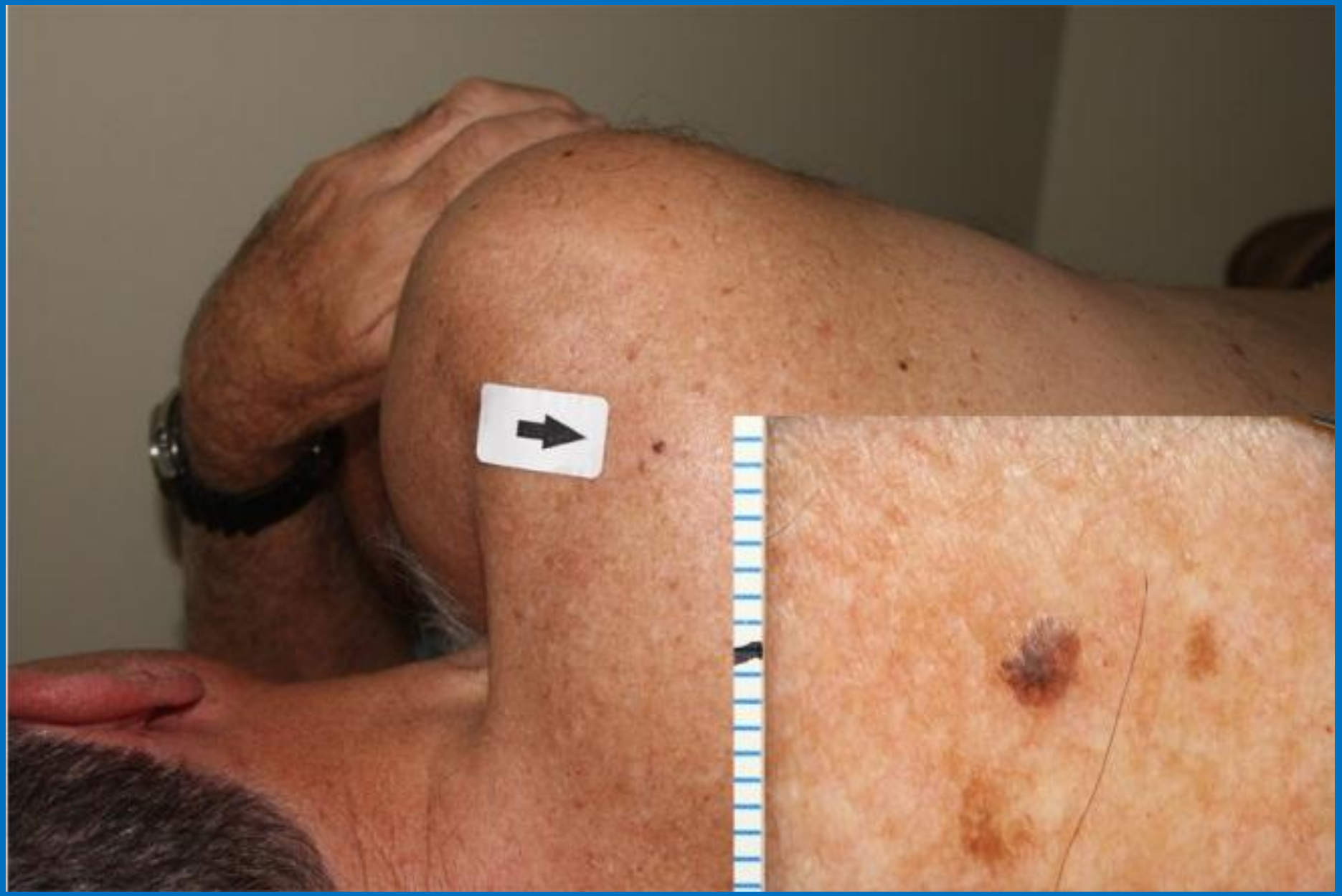
[3]

1. Grey or blue structures

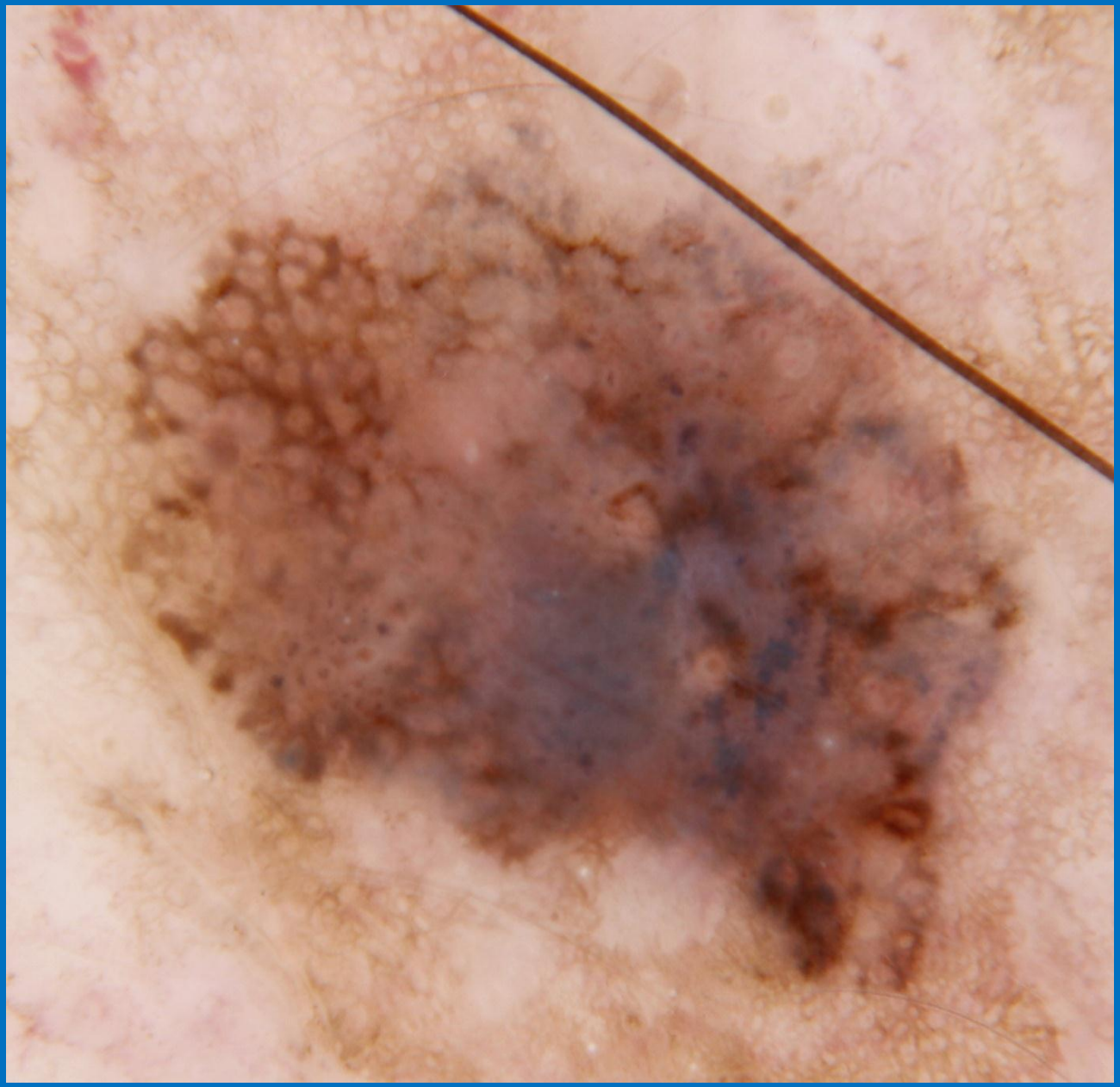




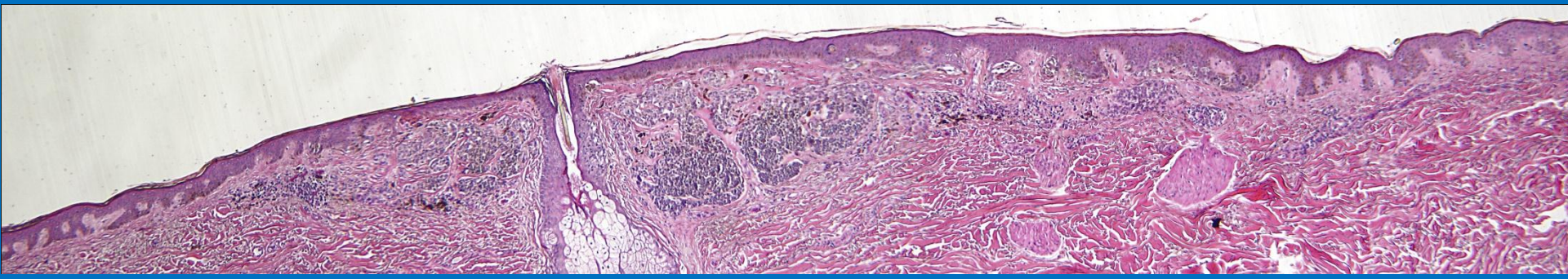
Chaos + Clue of a blue clod in a BCC. Chaos and Clues is a decision algorithm for generic pigmented malignancy – not just for melanoma.

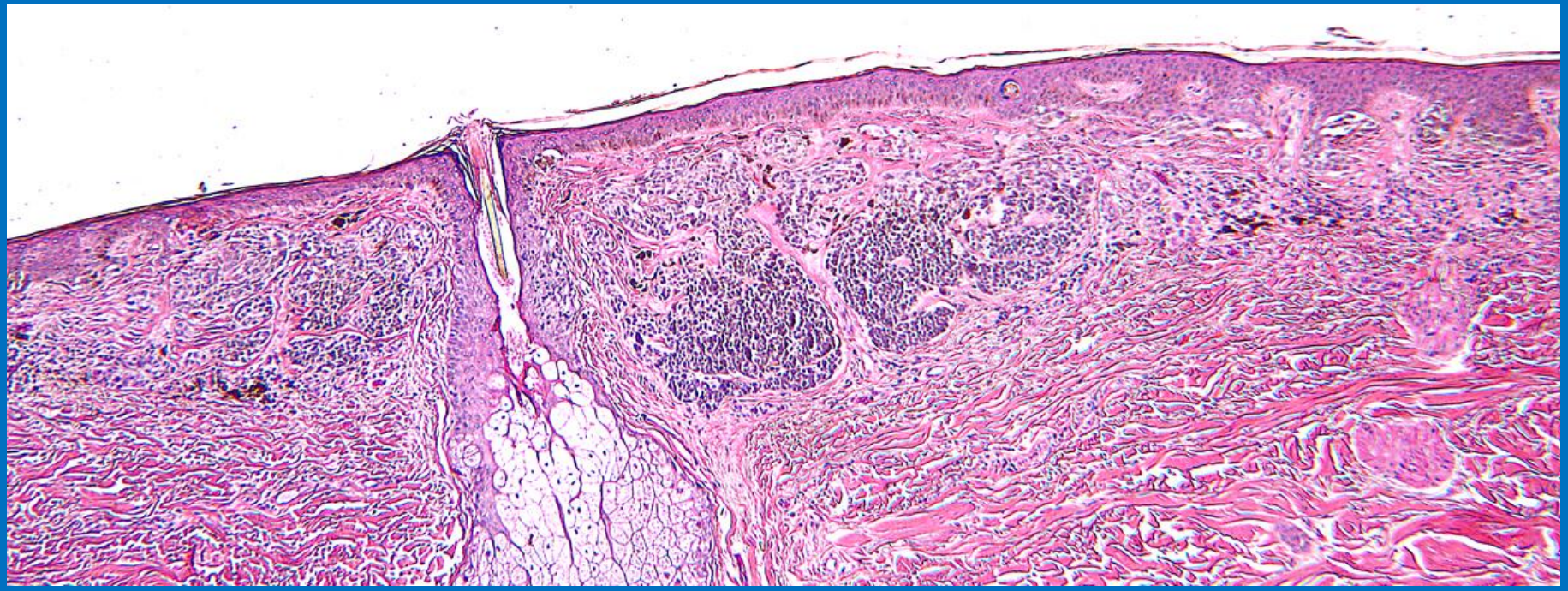


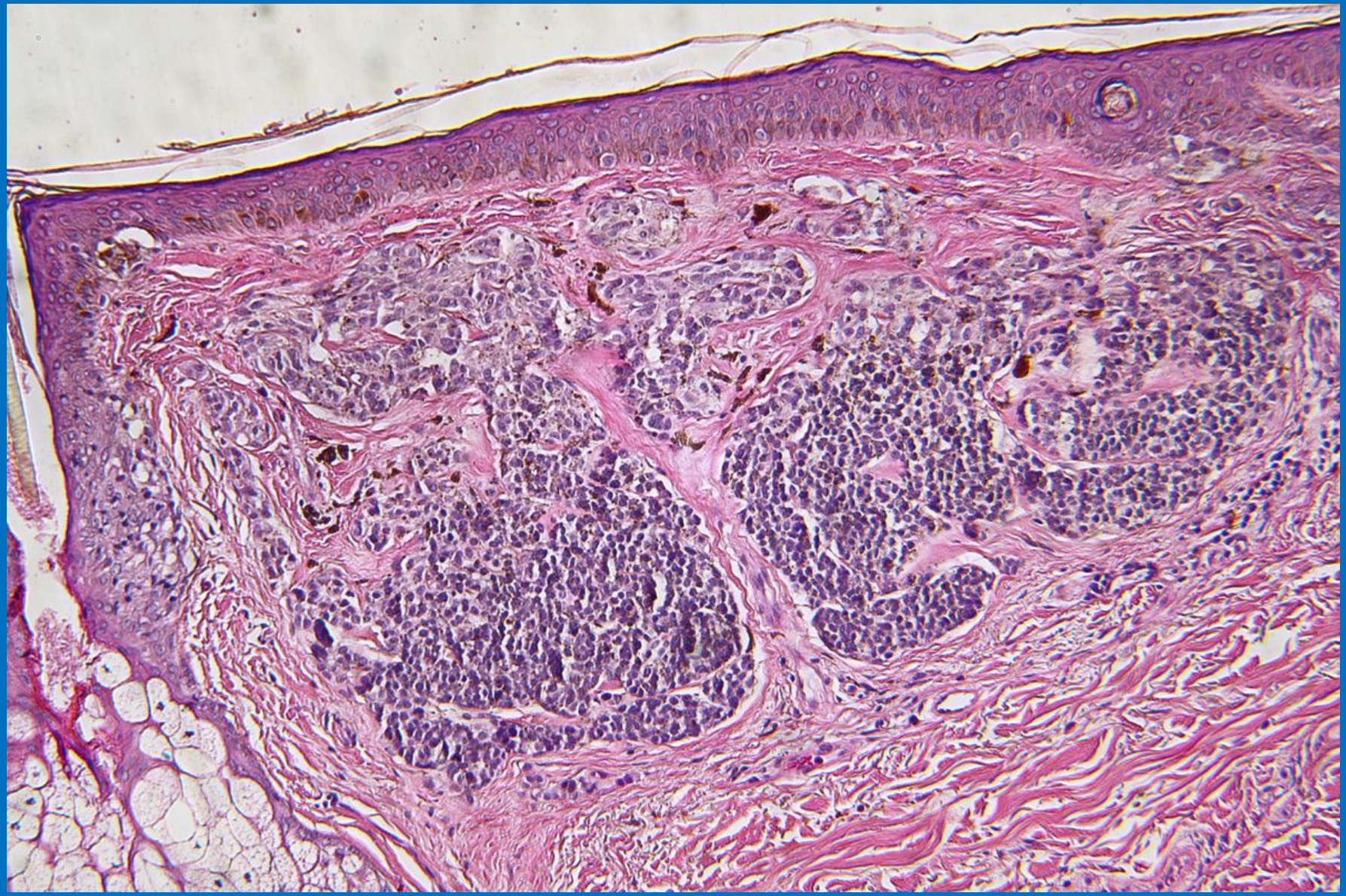
57 year-old surf lifesaver



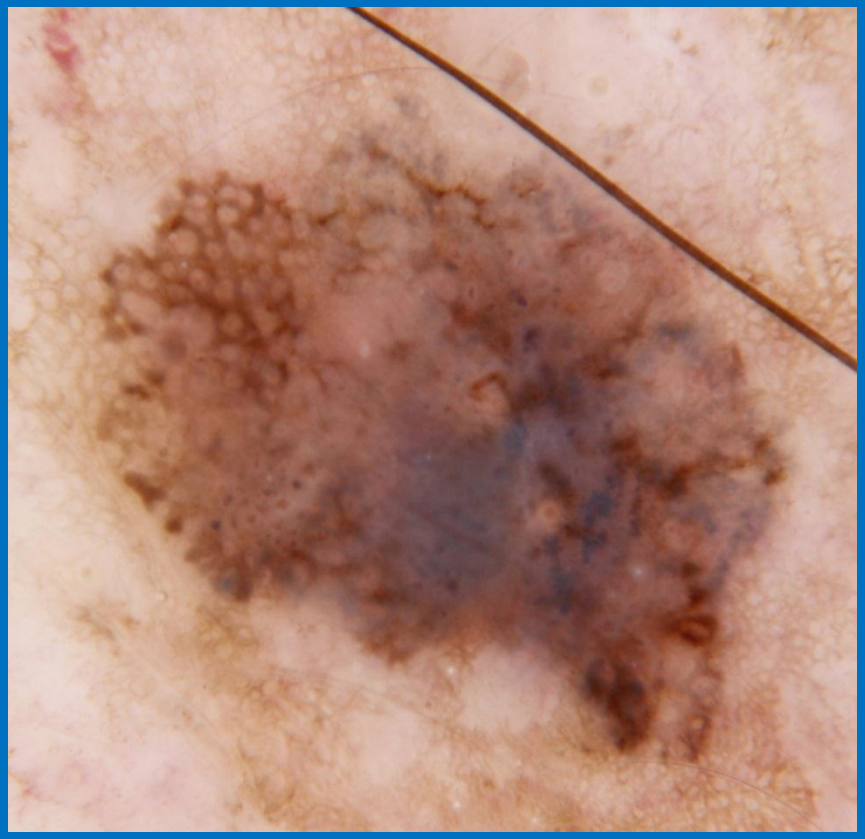
Network should correlate with pigmented cells on rete ridges and blue colour should correlate with nested, immature, melanin-containing melanocytes in the deep dermis.







Dermatopathology is consistent with the signed out diagnosis of naevus but this is NOT consistent with dermatoscopy. Blue colour should correlate with nested, immature, melanin-containing melanocytes in the deep dermis.



Clinical factors

↓

Dermatoscopic analysis

Patterns
Colours
Clues

↓

Build mental image of histology slide

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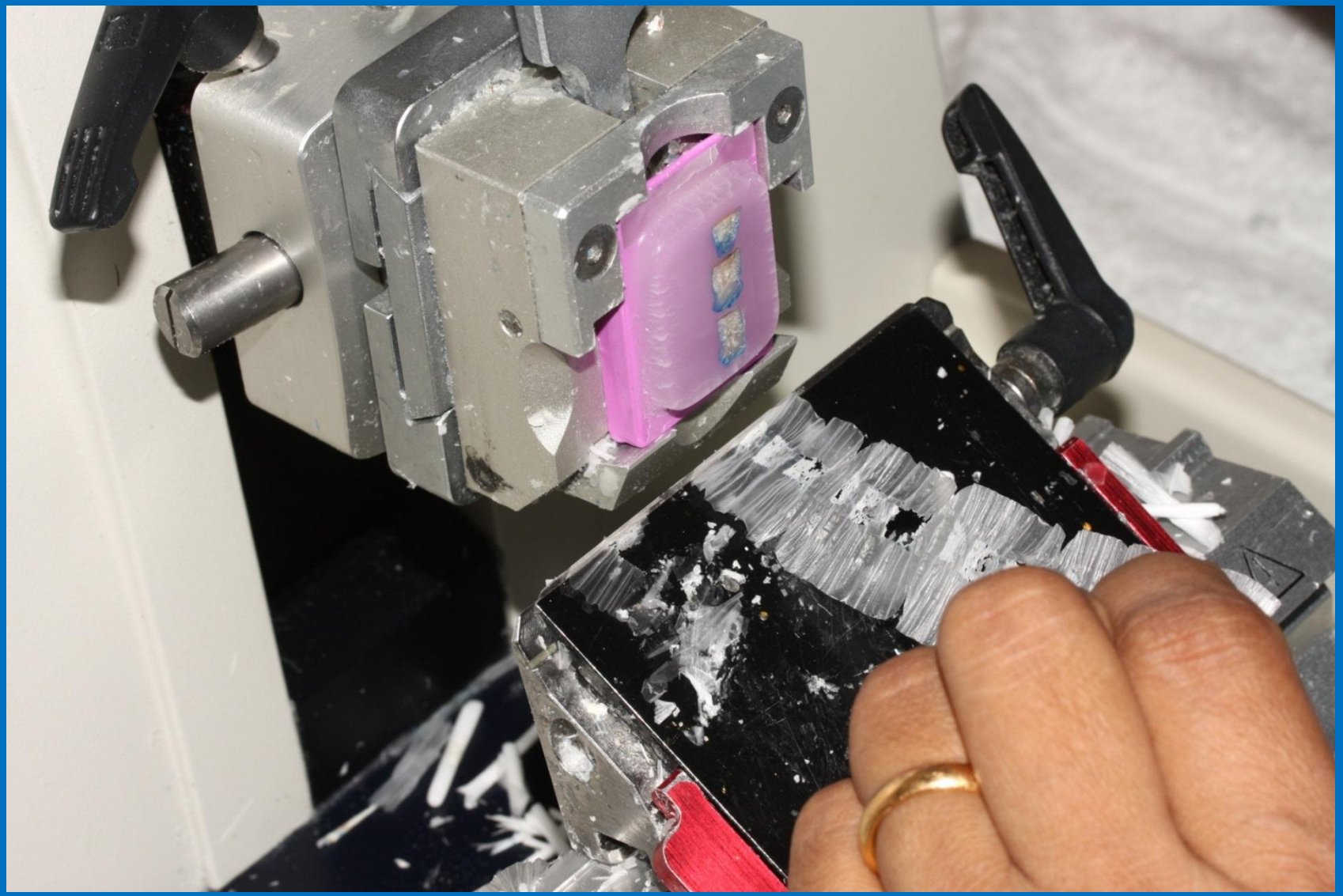
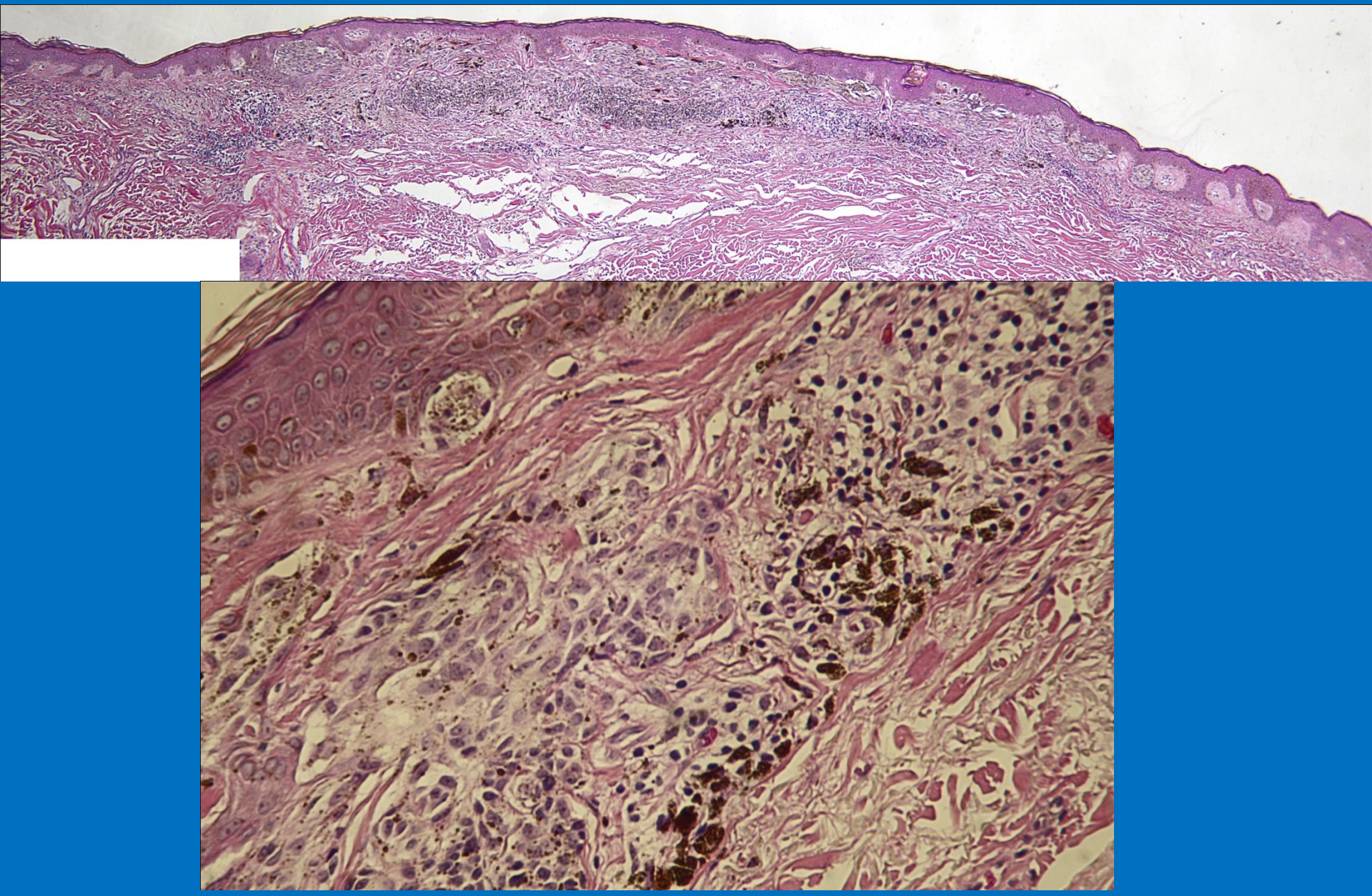
Predict histological diagnosis

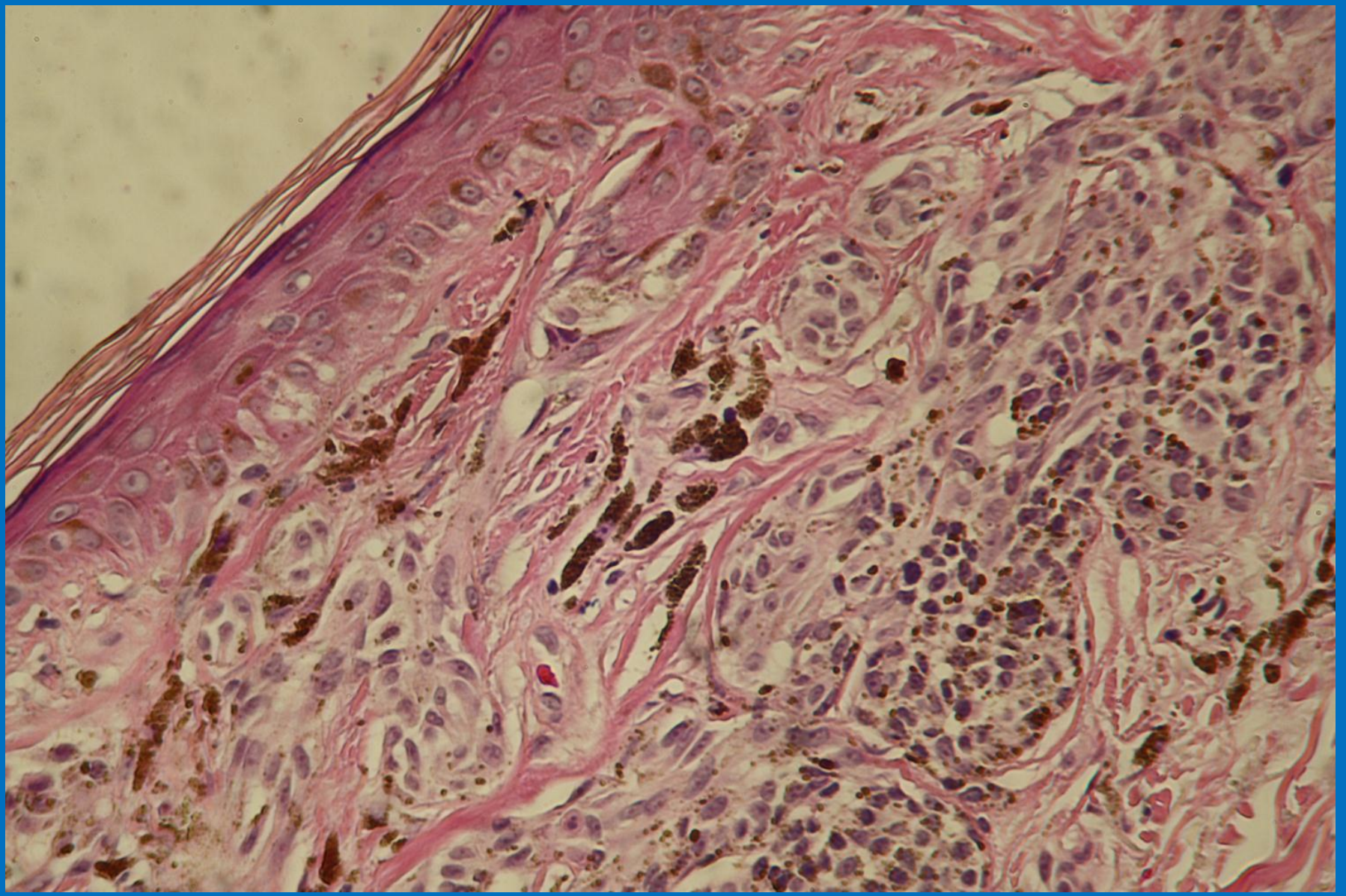
Because **dermatopathology does not correlate with dermatoscopy** a sampling error is suspected and the pathologist is requested to examine deeper levels in the paraffin block



“Deeper levels” equates to a greater proportion of the lesion being examined. In routine processing less than 2% of a lesion is examined dermatopathologically.

“deeper levels”

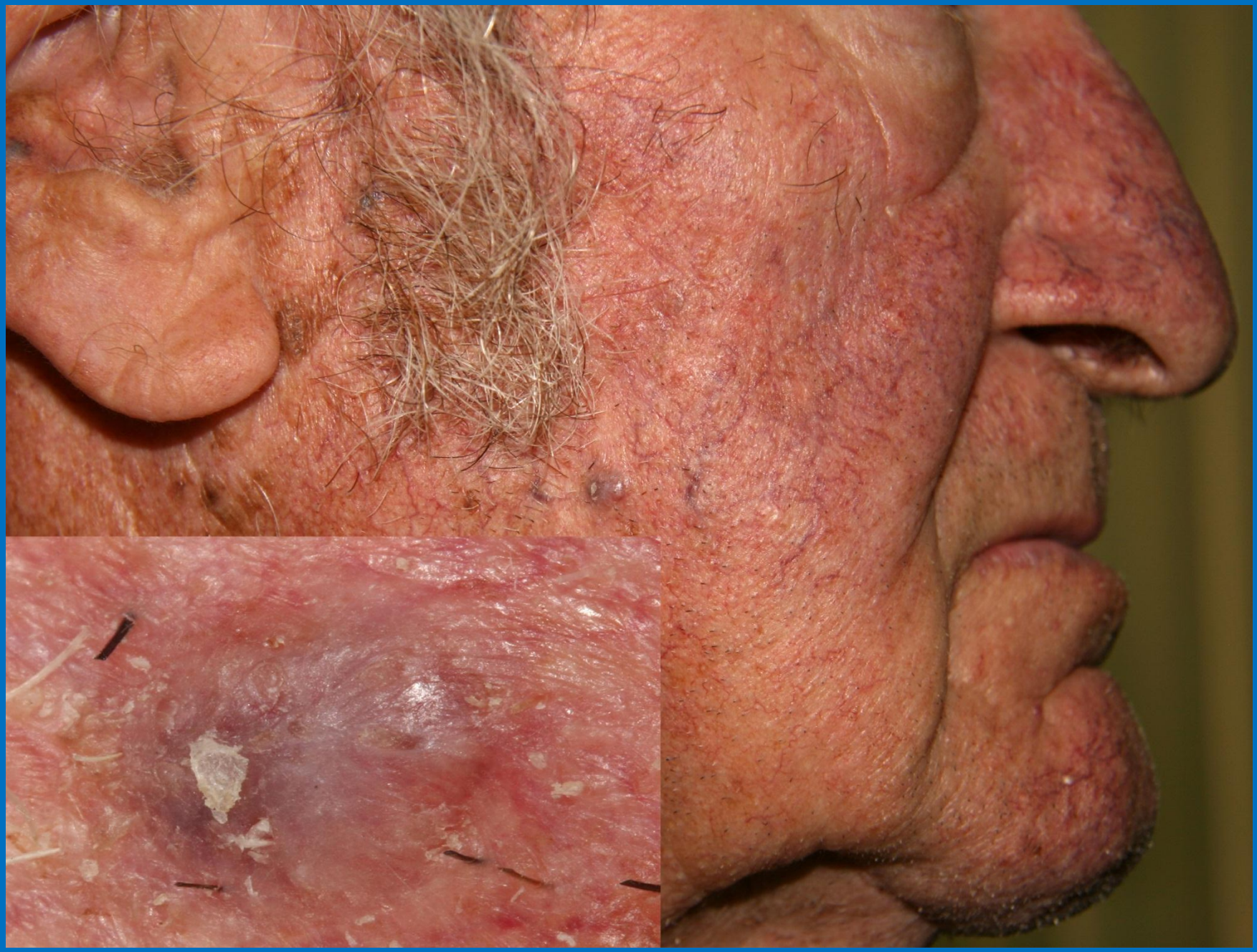


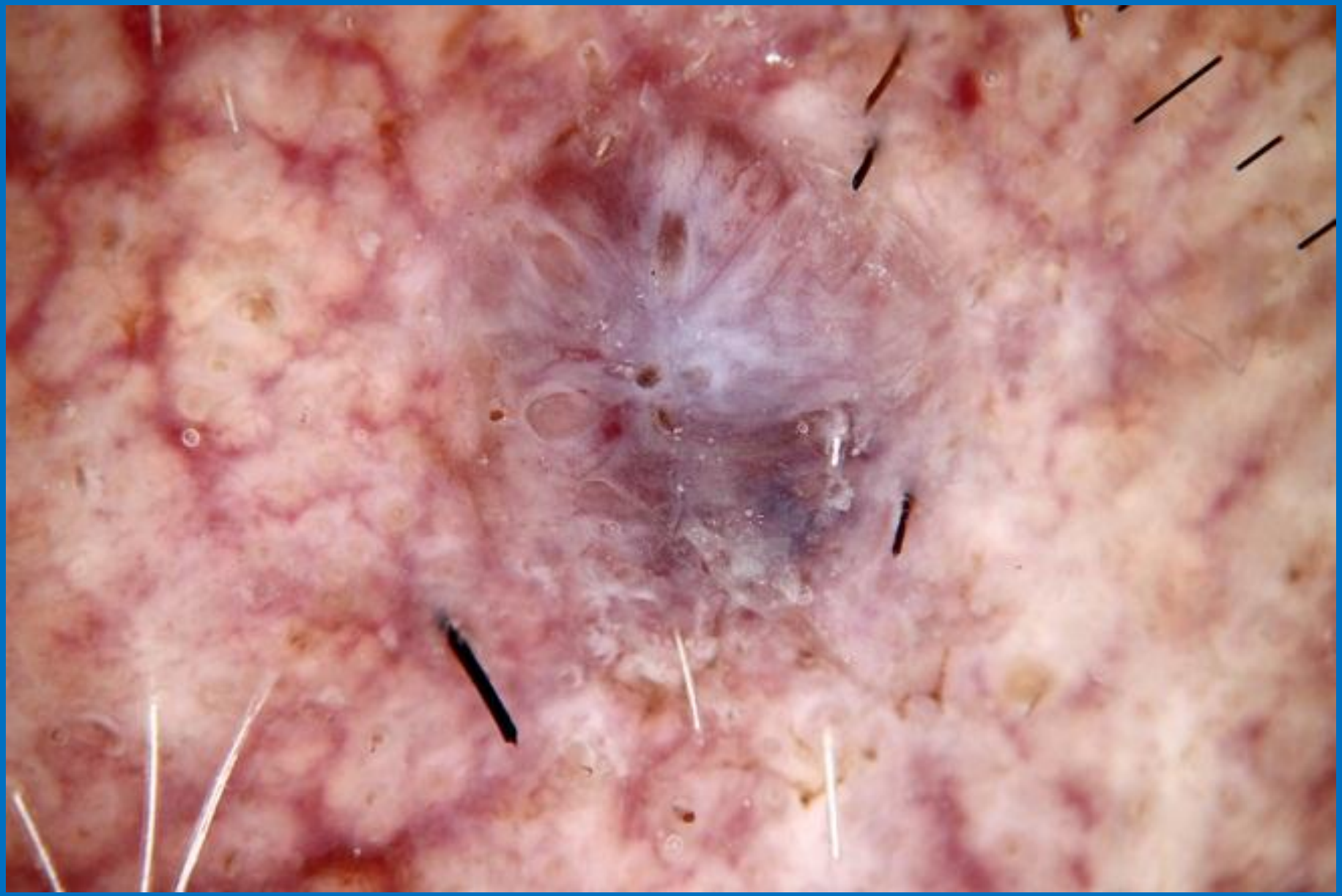


Examination of these new levels reveals exactly what was predicted from dermatoscopy. Nested, heavily pigmented melanocytes extend all the way to the base of the lesion.

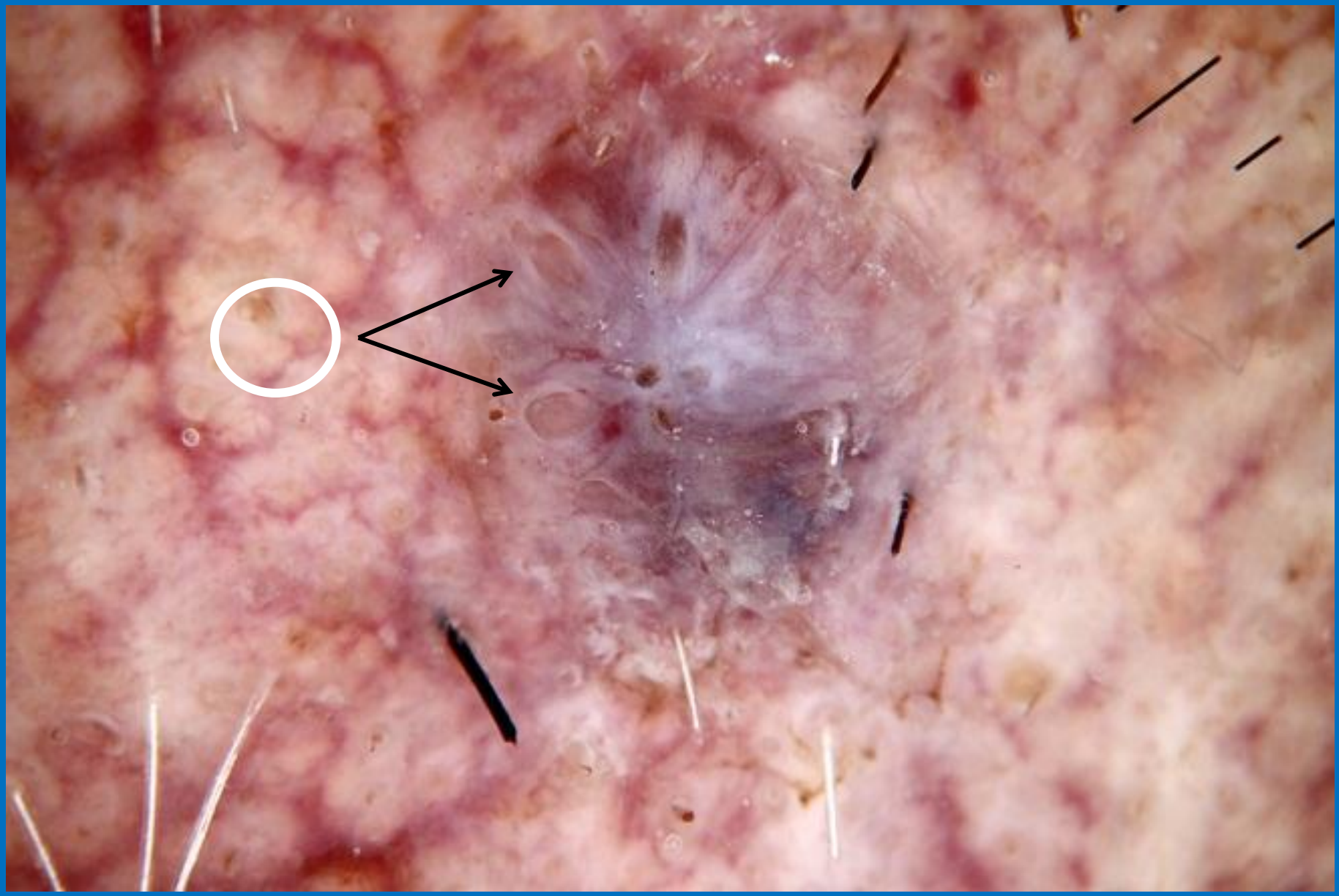
"…Sections show dysplastic compound naevus with moderate melanocytic atypia and focal regression. There is no evidence of malignancy. The margins appear well clear.

Supplementary Report
Multiple deeper levels have been examined in an attempt to better correlate the histology with the dermatoscopy. These show a focus of early level 2 **(invasive)** superficial spreading malignant **melanoma**…"

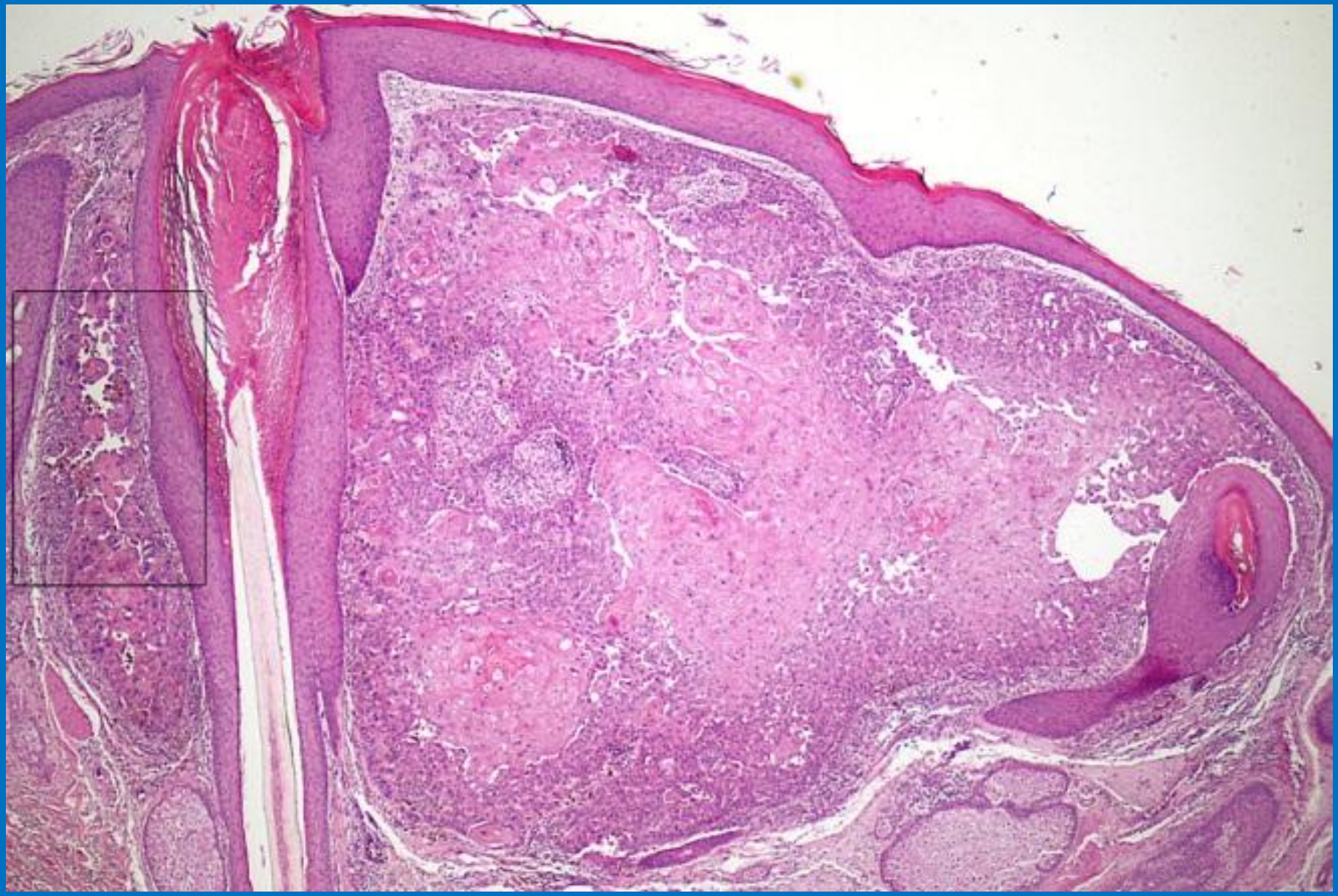


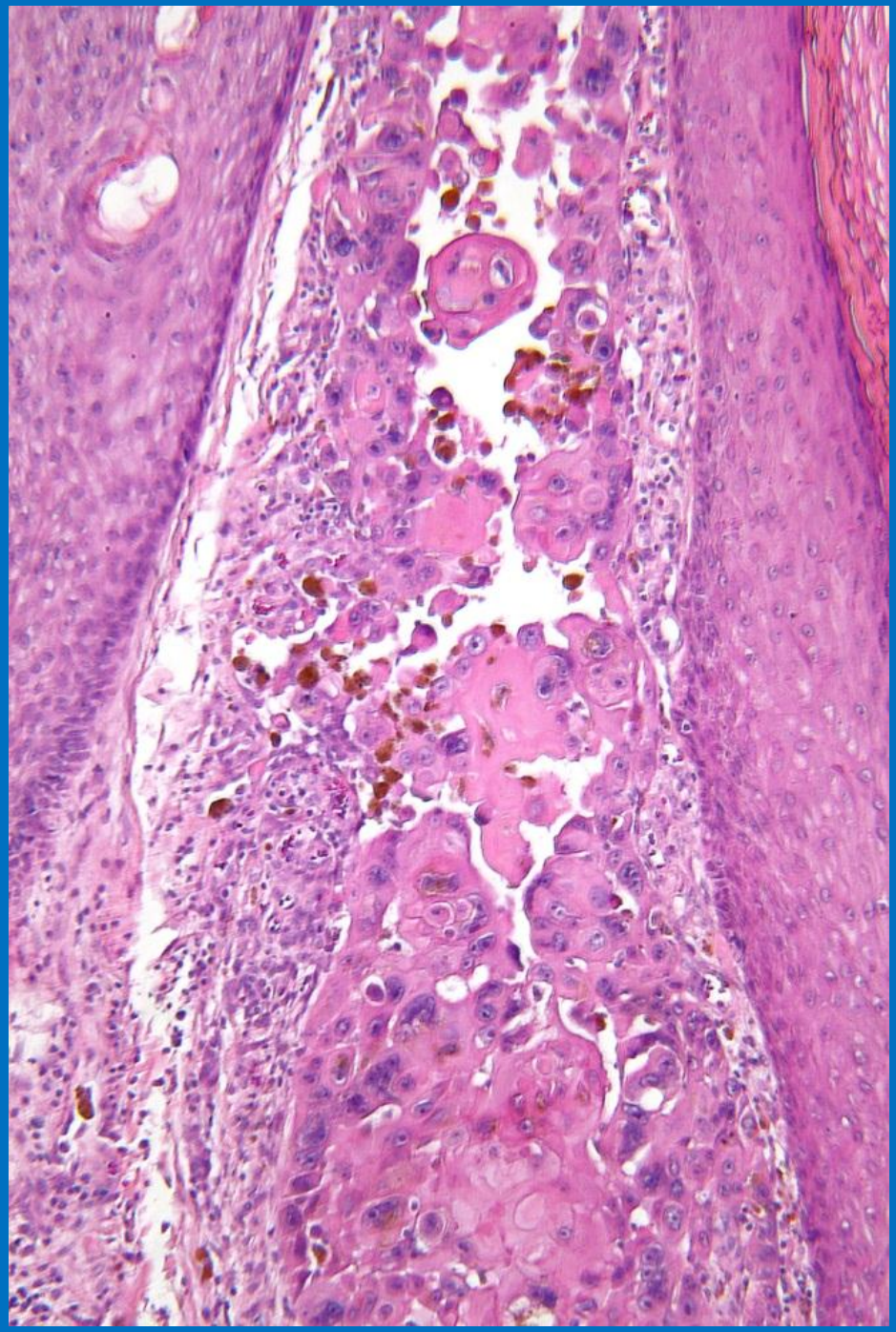


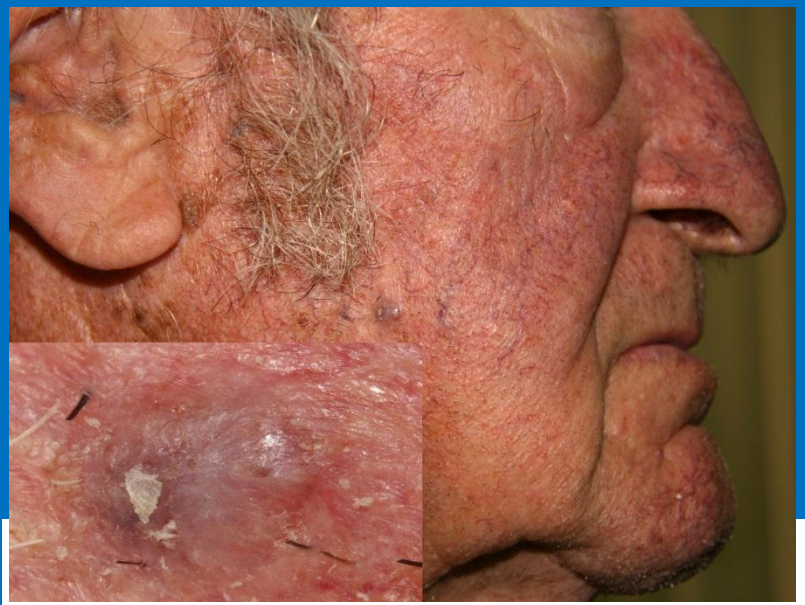
Chaos + Clue (blue structureless) predict suspicion for malignancy

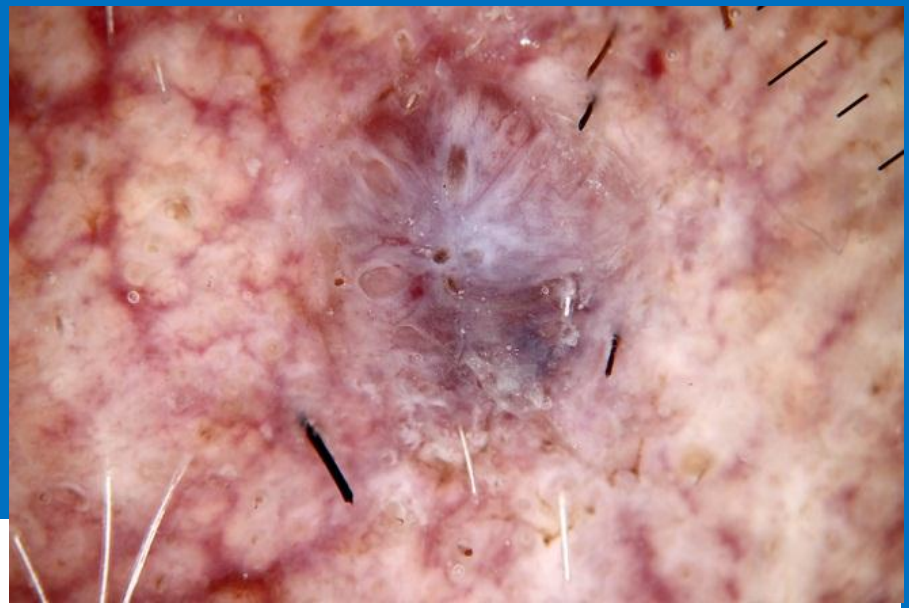


Application of Revised Pattern Analysis leads to a specific diagnosis of the extremely rare condition of pigmented invasive squamous cell carcinoma.









DERMATOLOGY PRACTICAL & CONCEPTUAL

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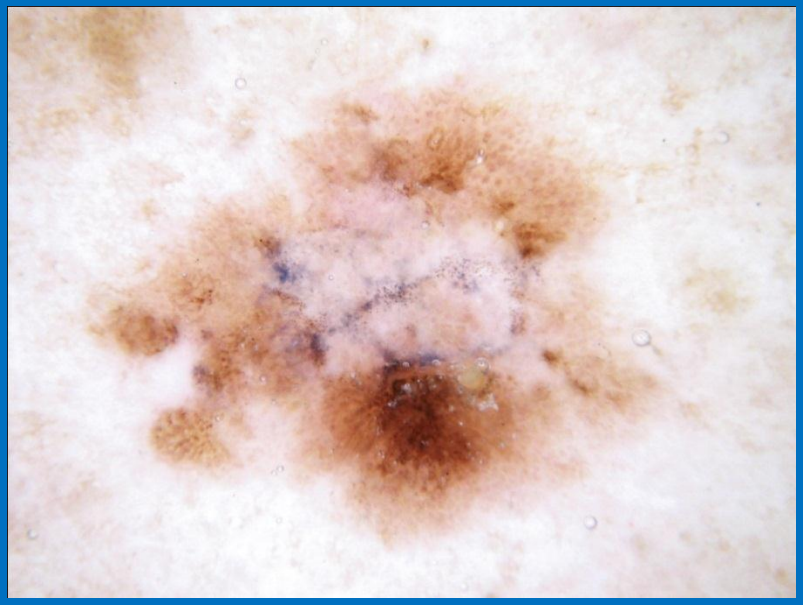
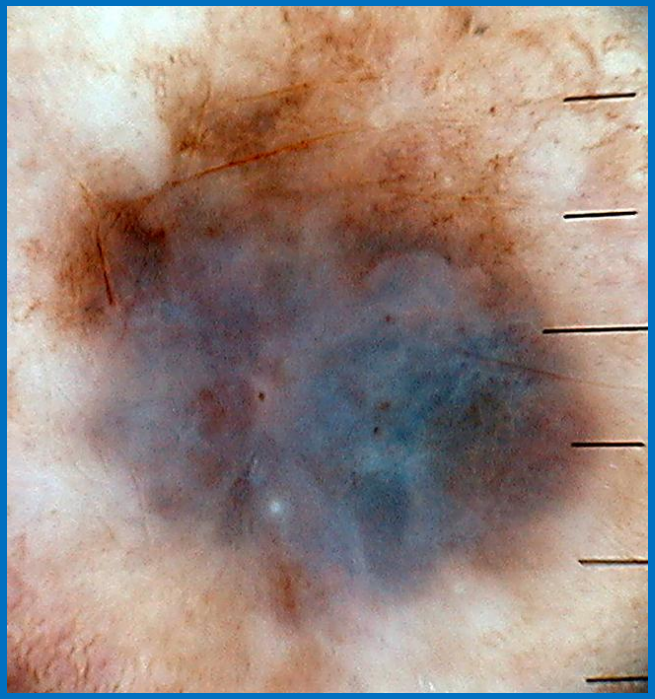
Cutaneous pigmented invasive squamous cell carcinoma: a case report with dermatoscopy and histology

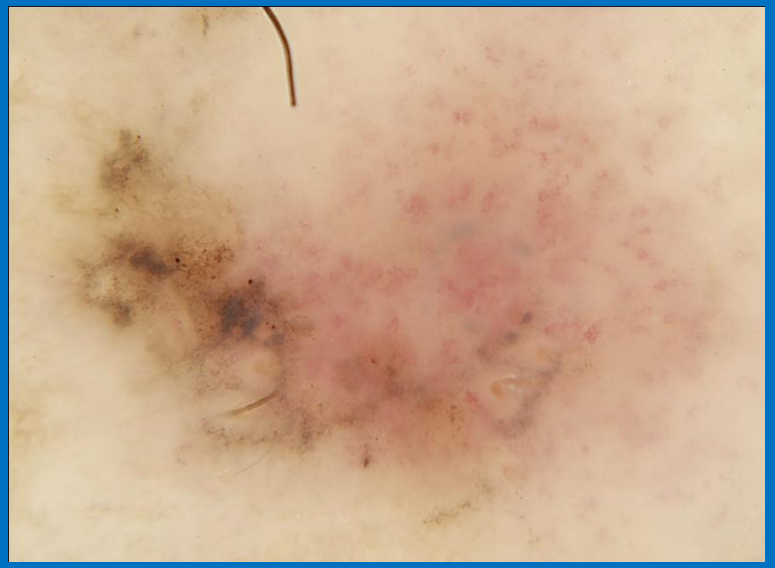
Cliff Rosendahl, MBBS[1], Alan Cameron, MBBS[1], Agata Bulinska, M.D.[1], David Weedon, M.D.[2]

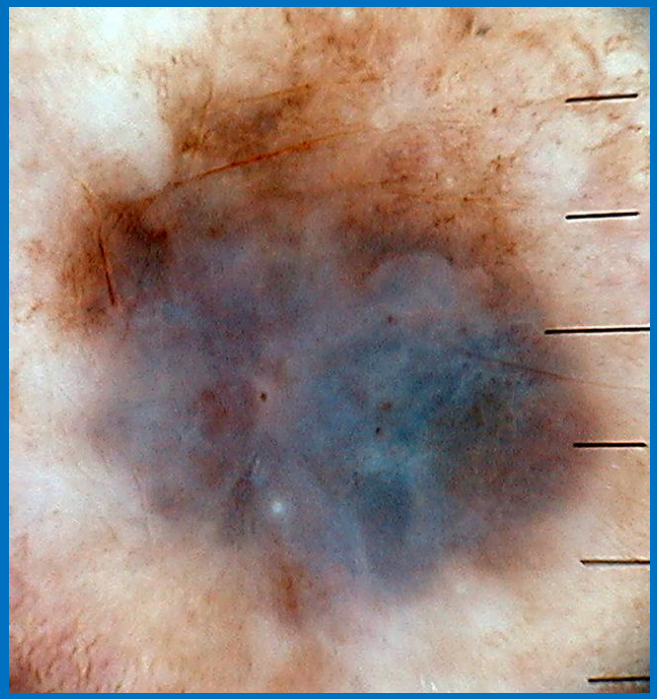
2. Eccentric structureless area

Any colour except skin colour.
Significant area – at least 25%
Black, brown, grey, blue = melanin
Pink, red = blood
White = collagen or keratin

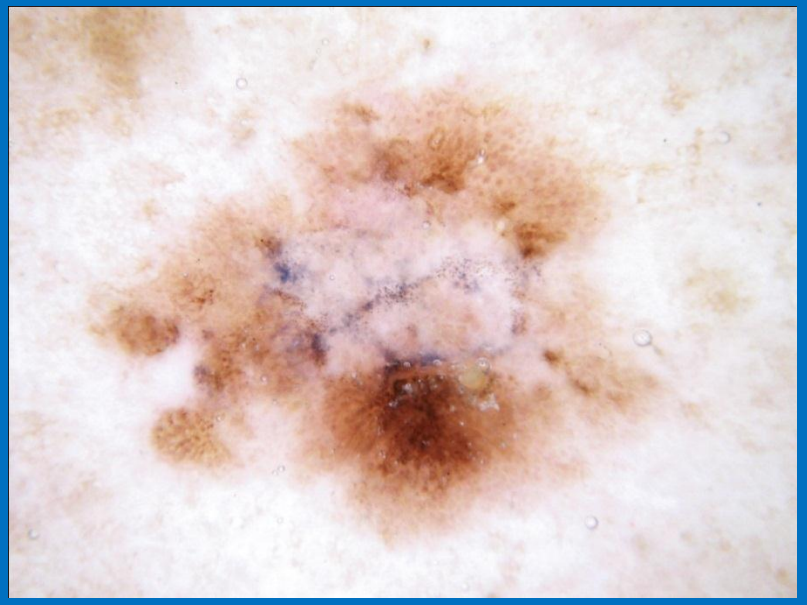




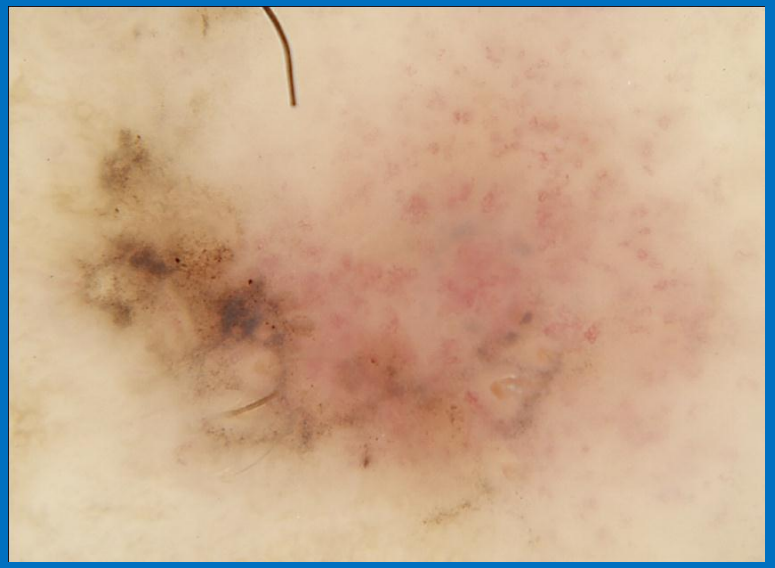




Melanoma



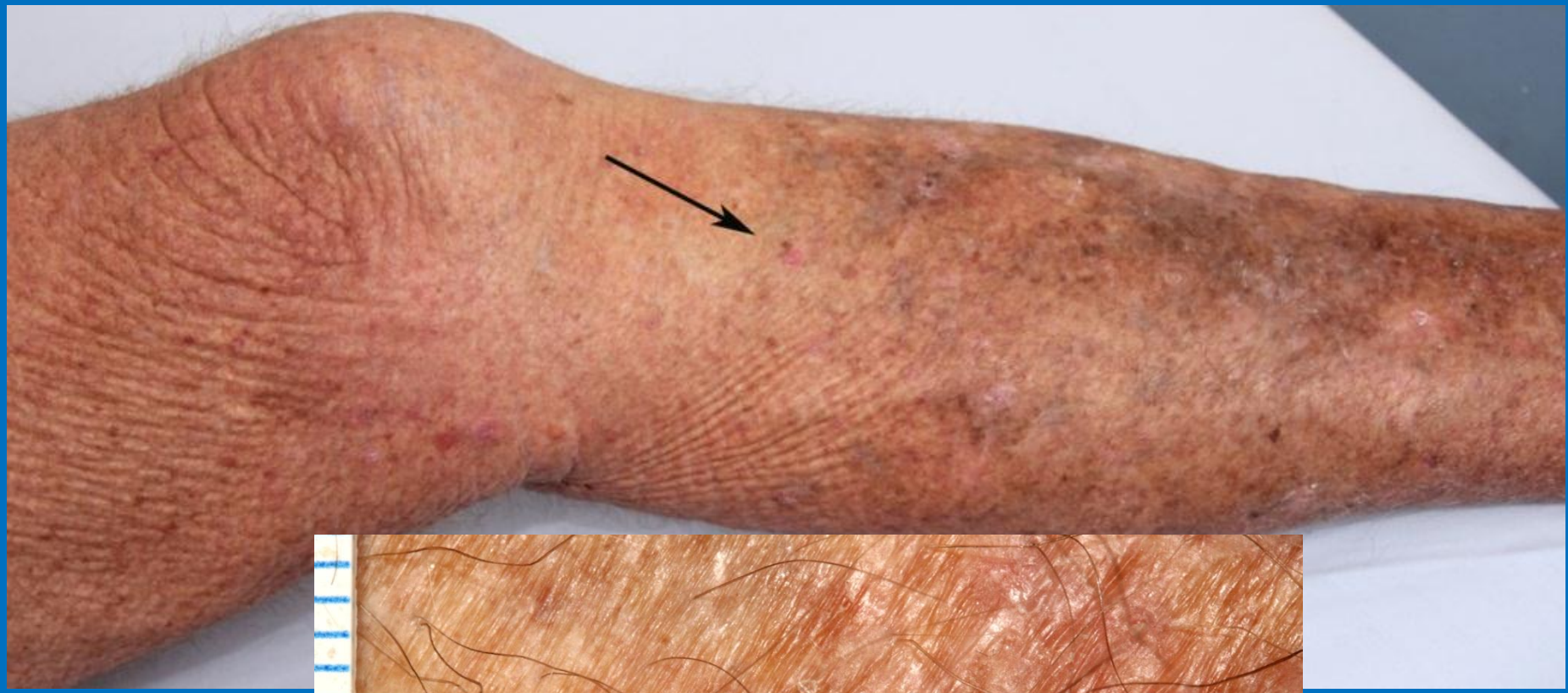
Pigmented SCC in-situ (specific clue is dots in linear arrangement)

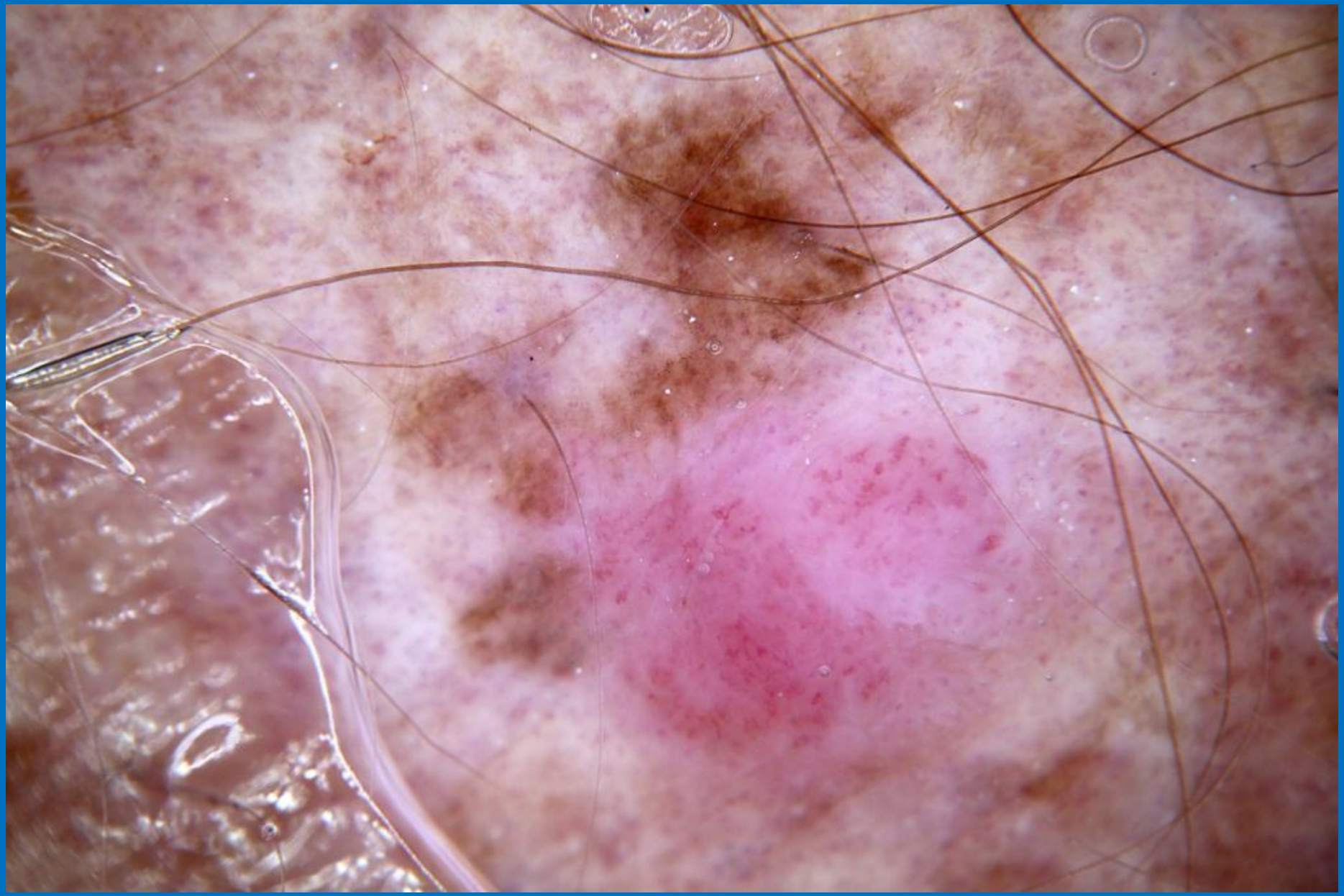


Pigmented BCC. Melanoma was predicted but that is OK *

***Only the pathologist can see melanocytes!**

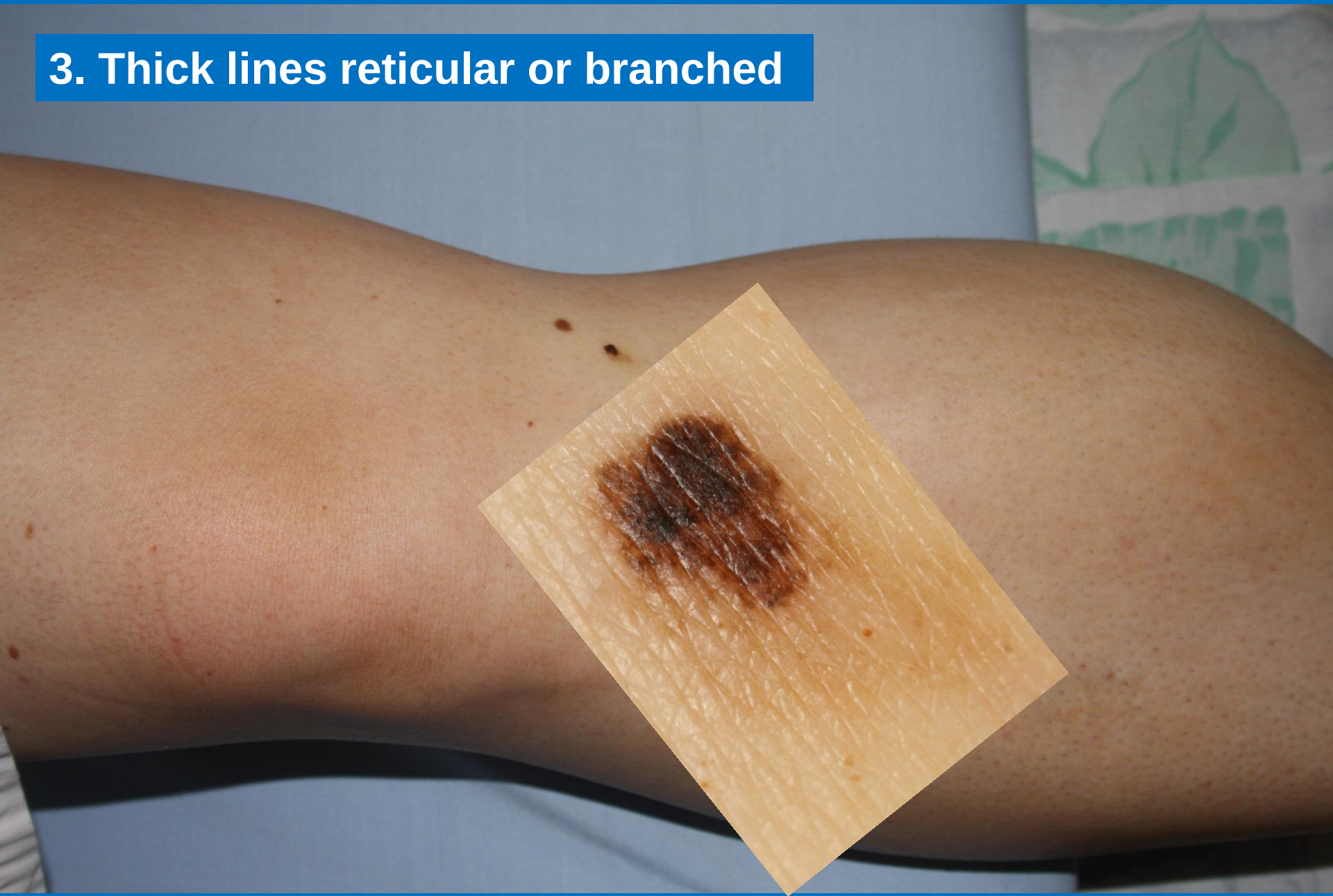
In difficult cases let him/her sort that out

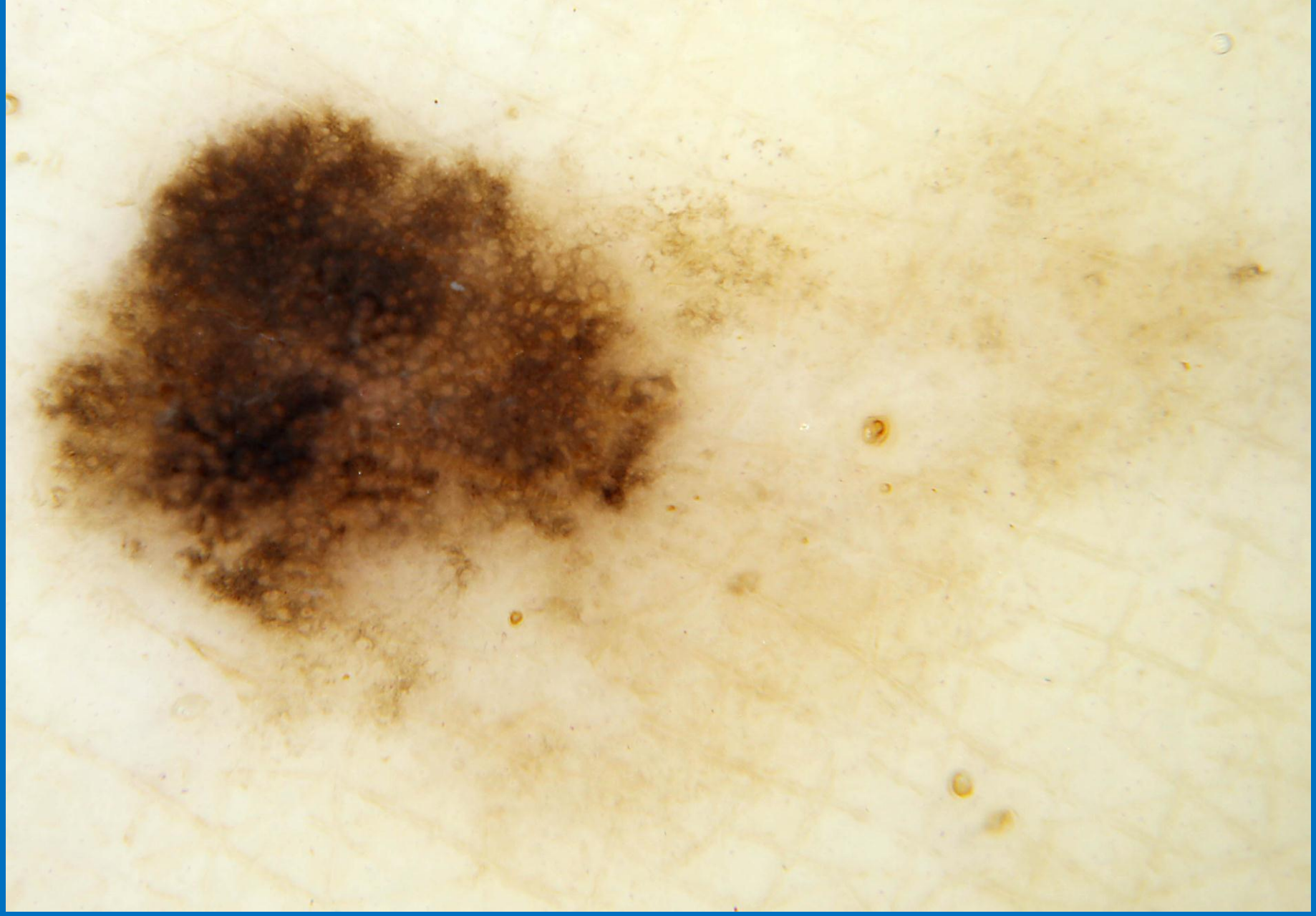




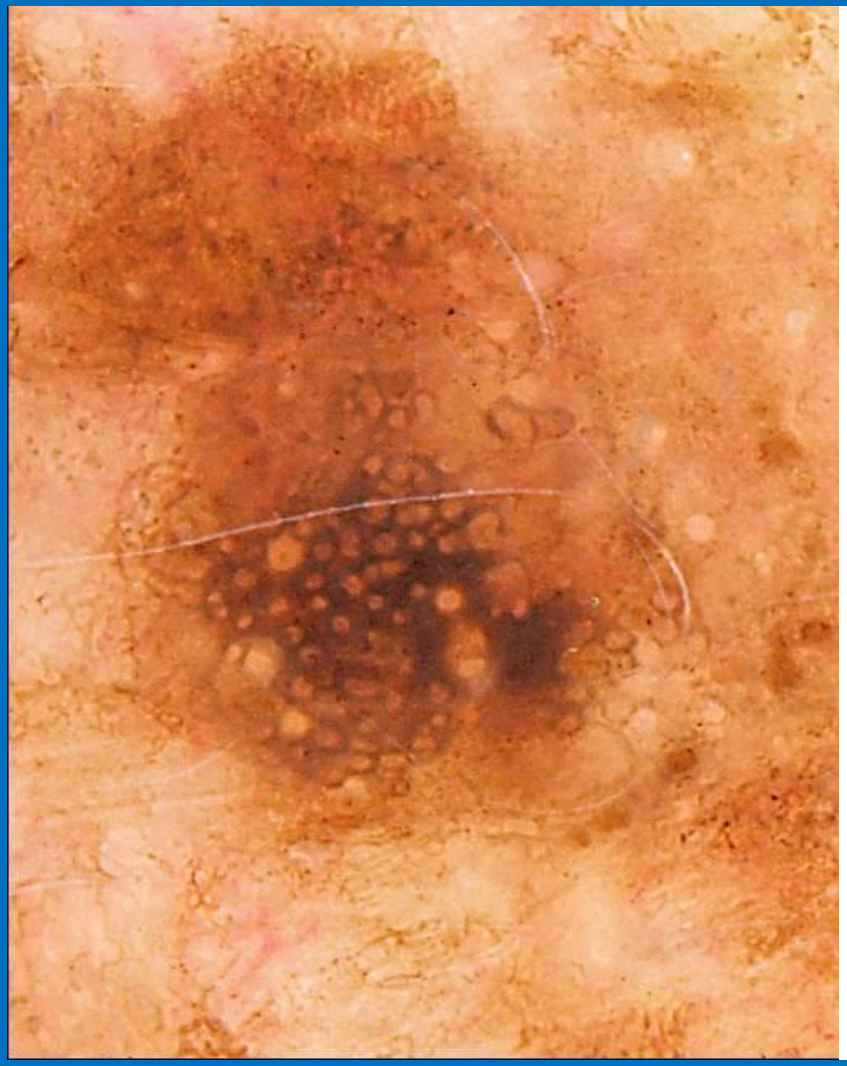
Chaos + Clue of eccentric structureless pink lead to prediction of malignancy. Applying Revised Pattern Analysis polymorphous vessels including dots is a specific clue to melanoma

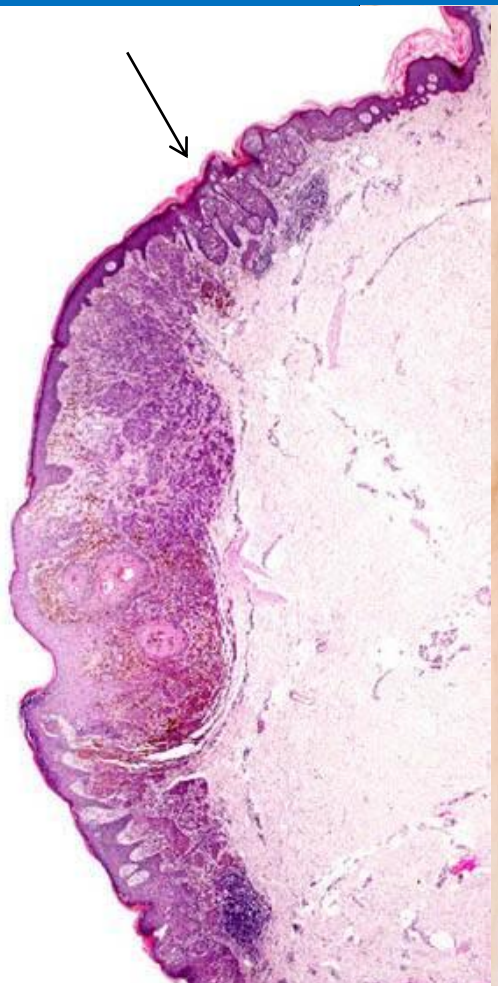
3. Thick lines reticular or branched





The lines should be thicker than the holes they surround. This correlates with rete ridges packed full of pigmented malignant melanocytes and due to the chaotic behaviour of malignant tissue this clue will be present focally.





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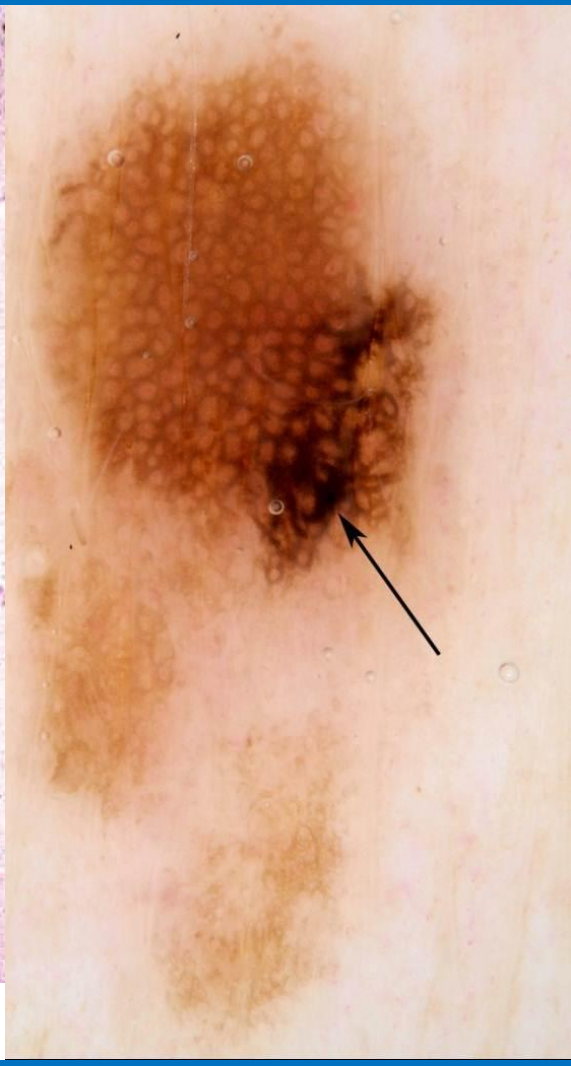
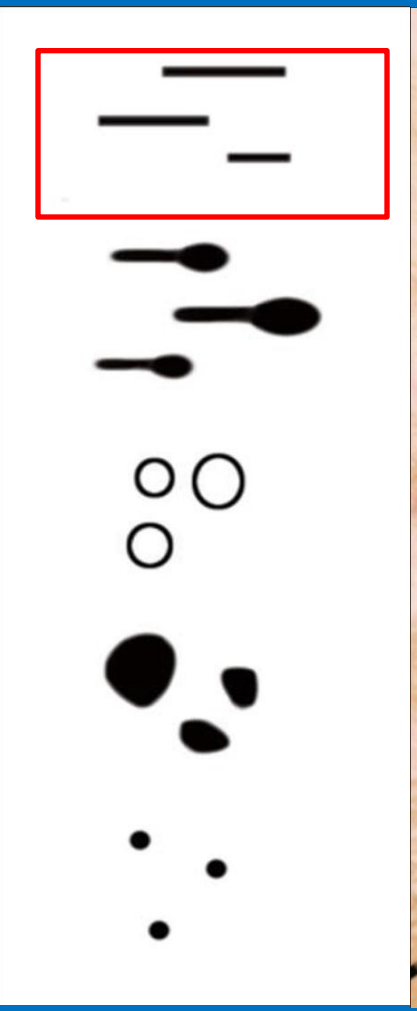
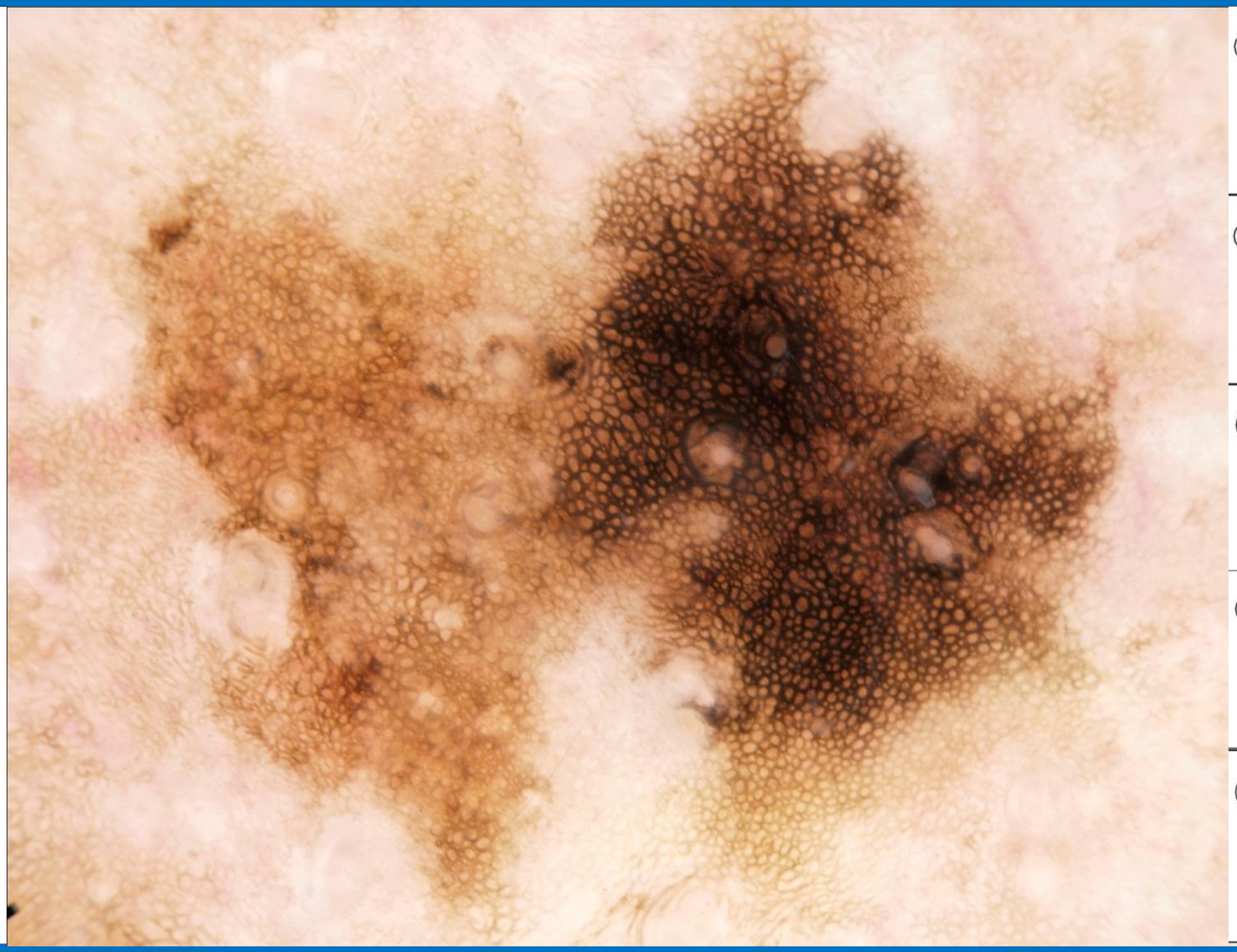
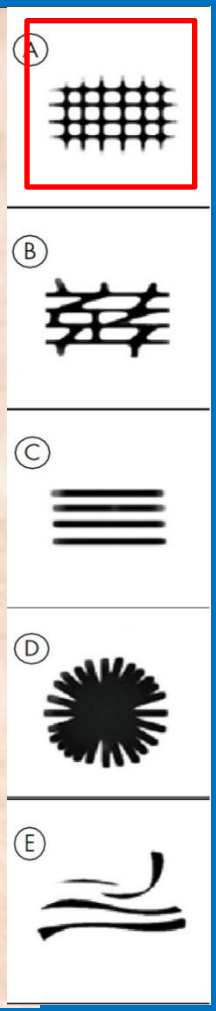


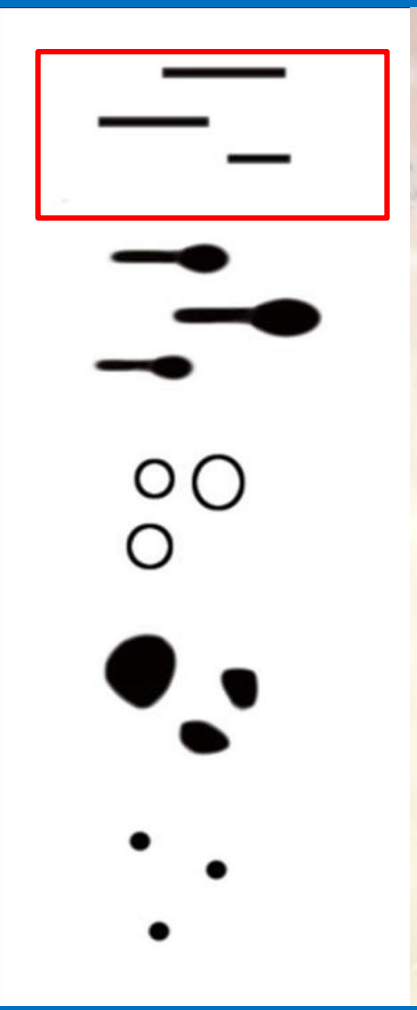
Types of lines



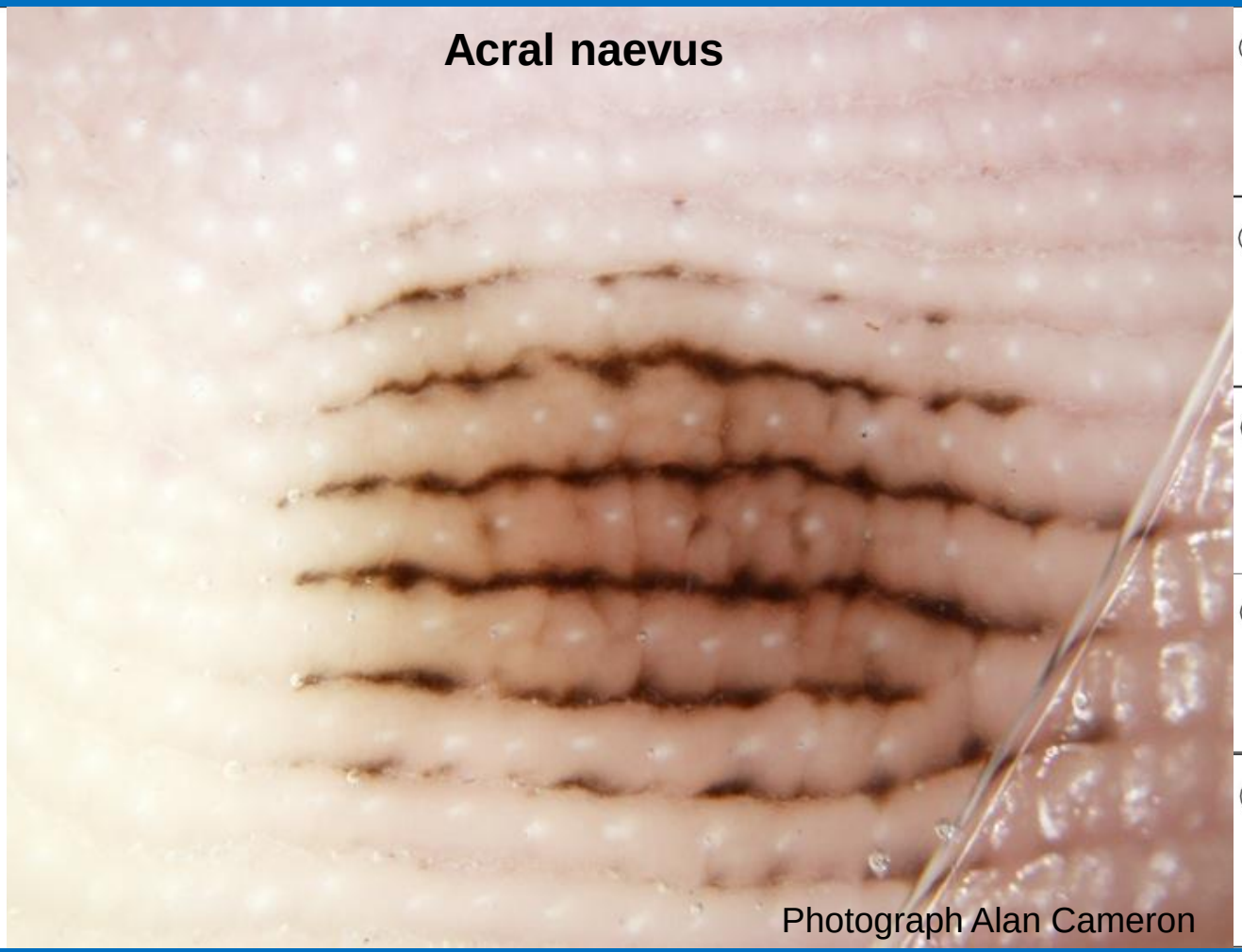




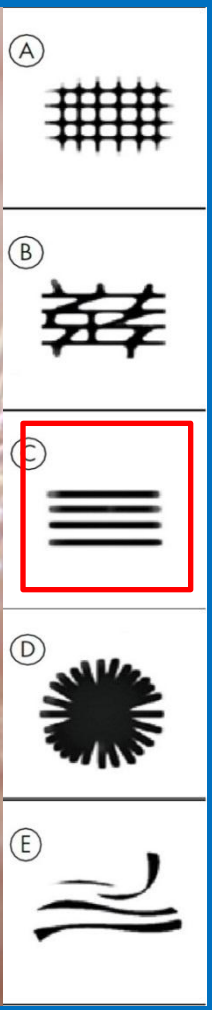
Lines reticular



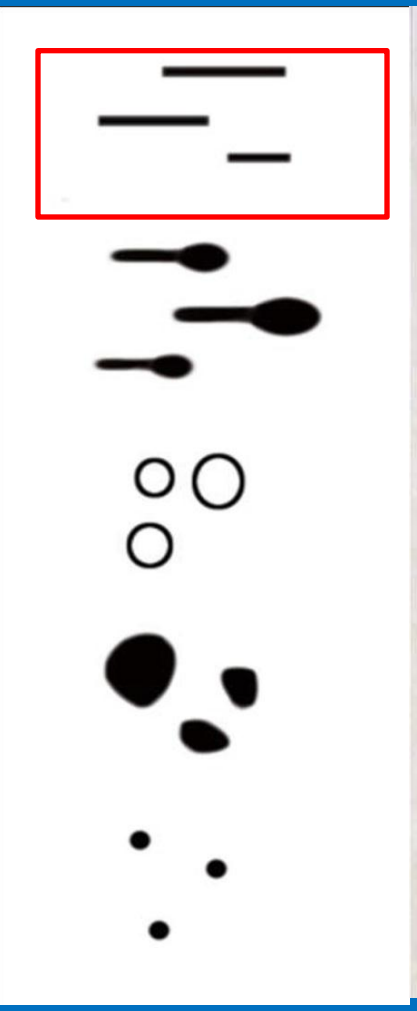
Acral naevus

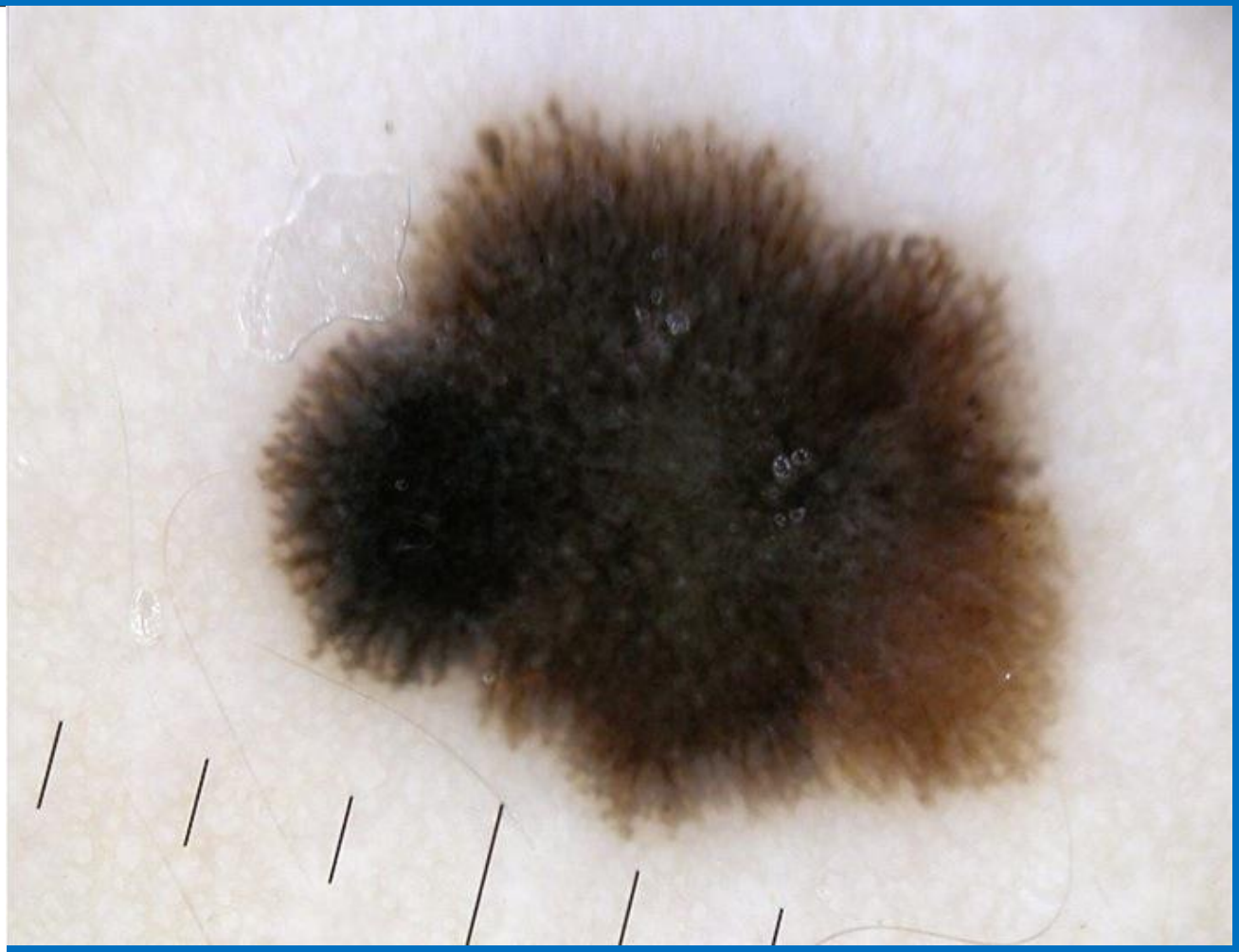


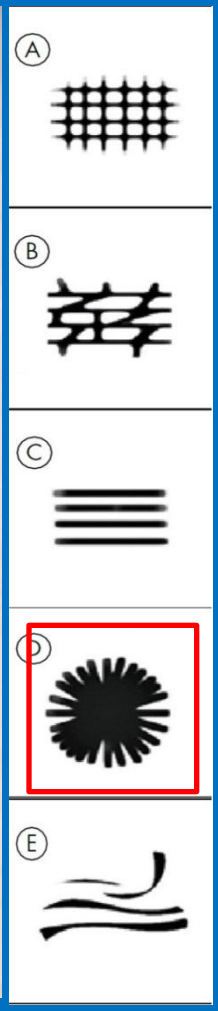
Photograph Alan Cameron



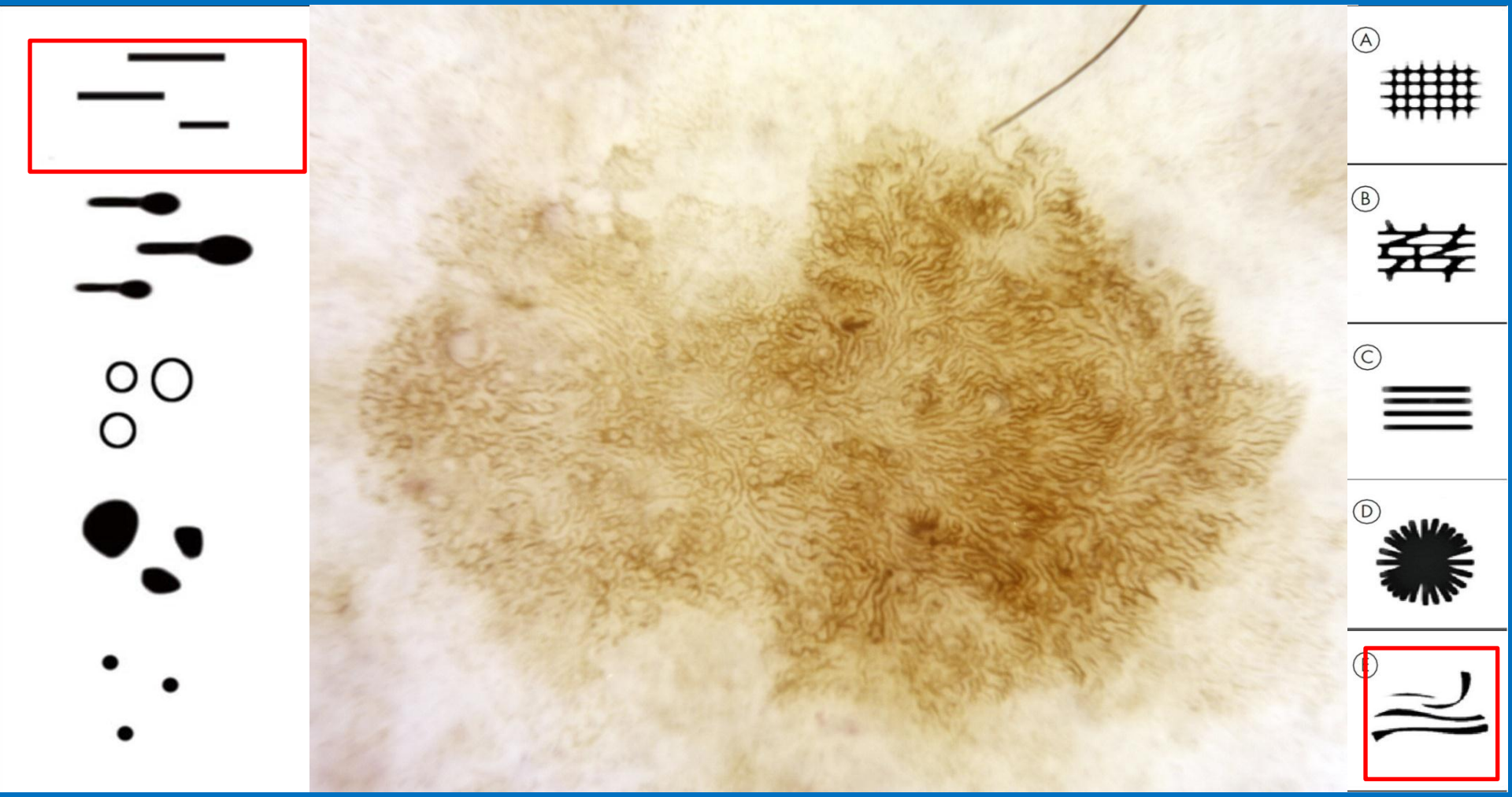
Lines parallel



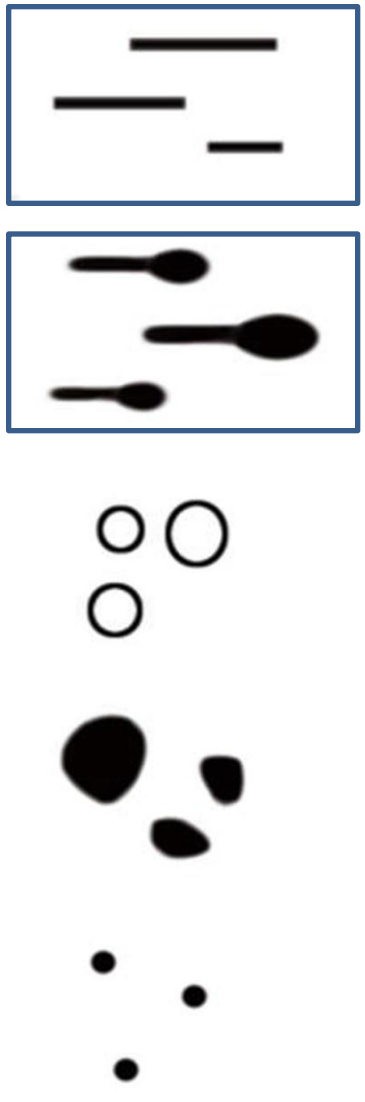


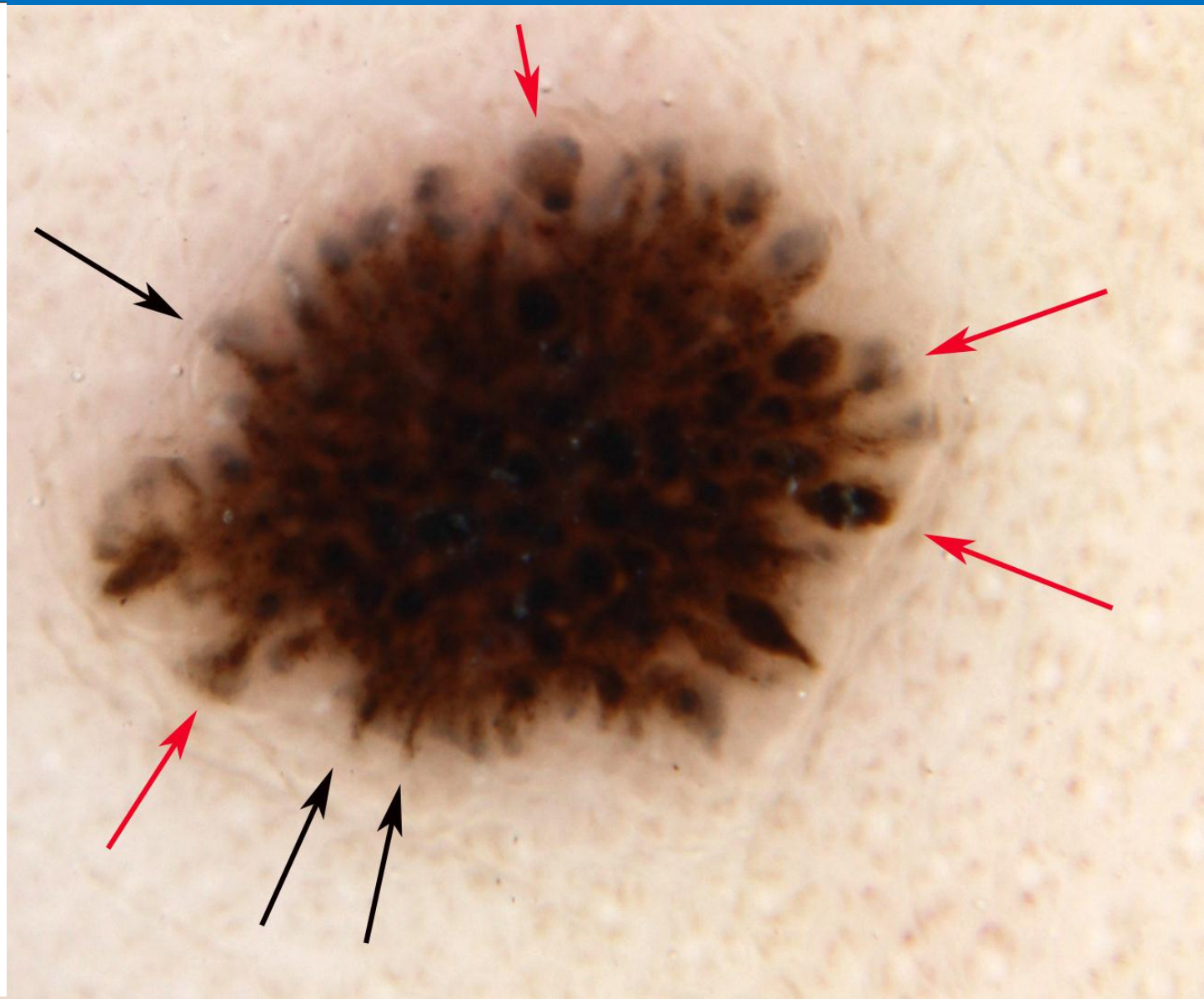


Lines radial



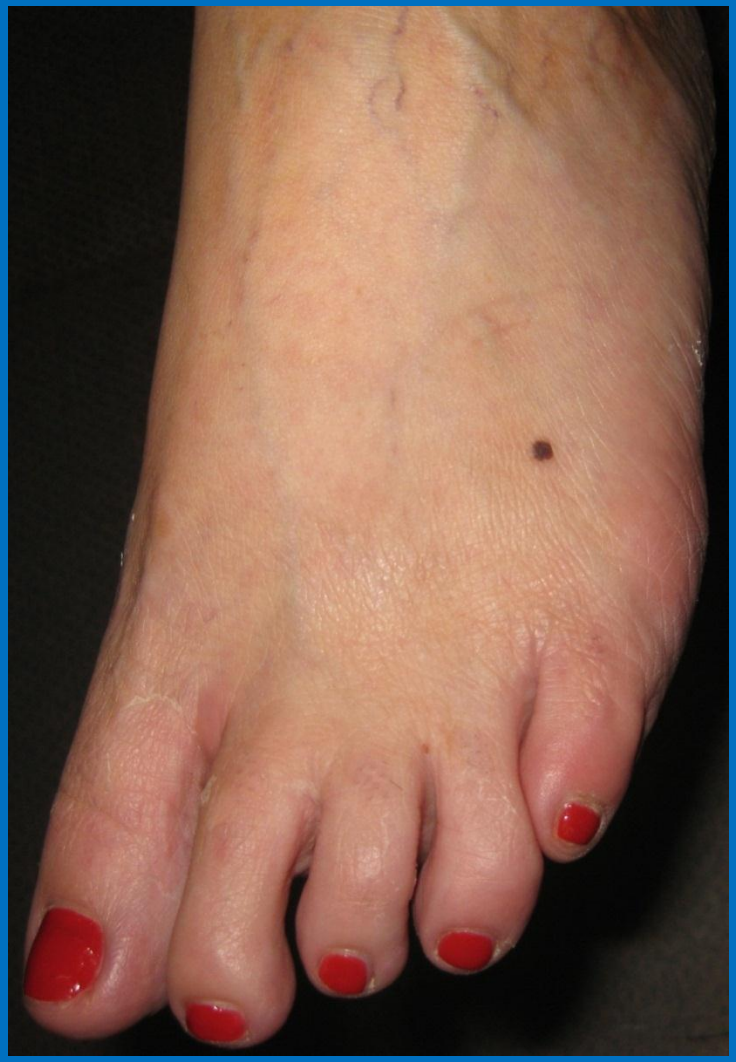
Lines curved

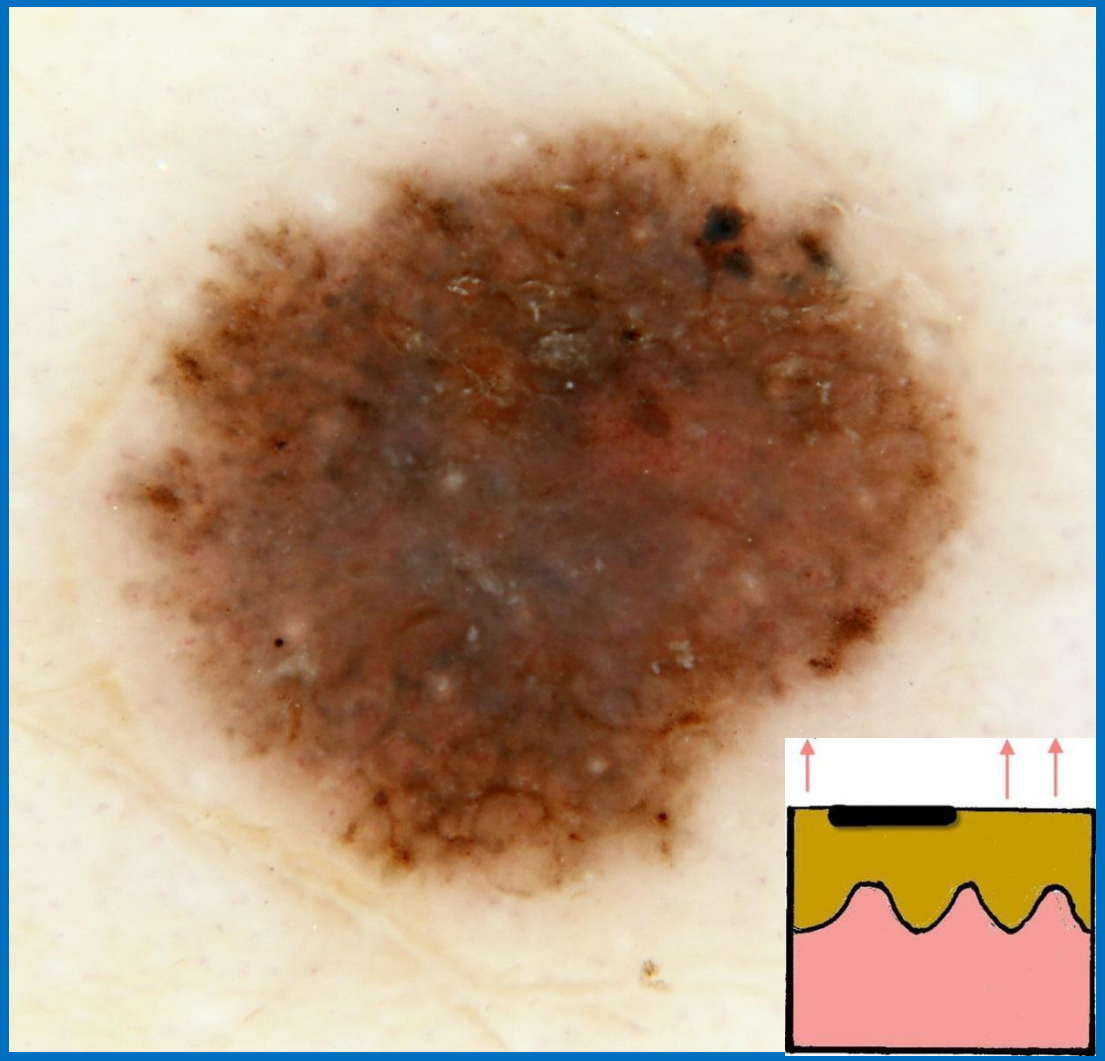




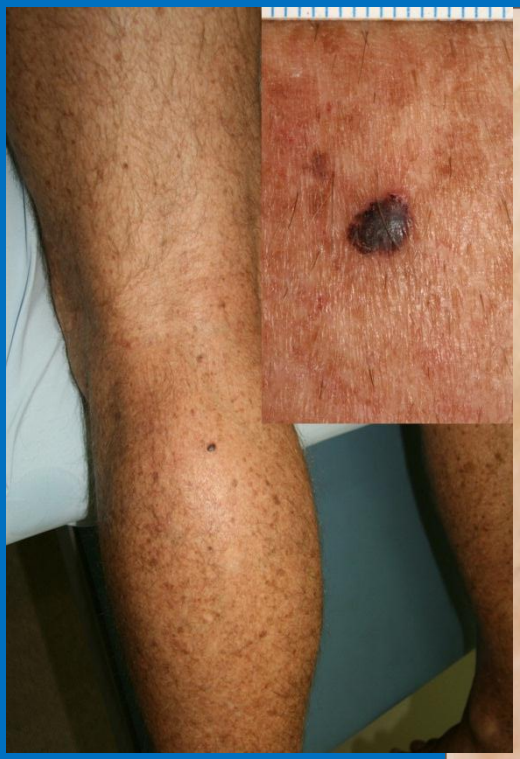
Pseudopods – red arrows, Lines radial – black arrows

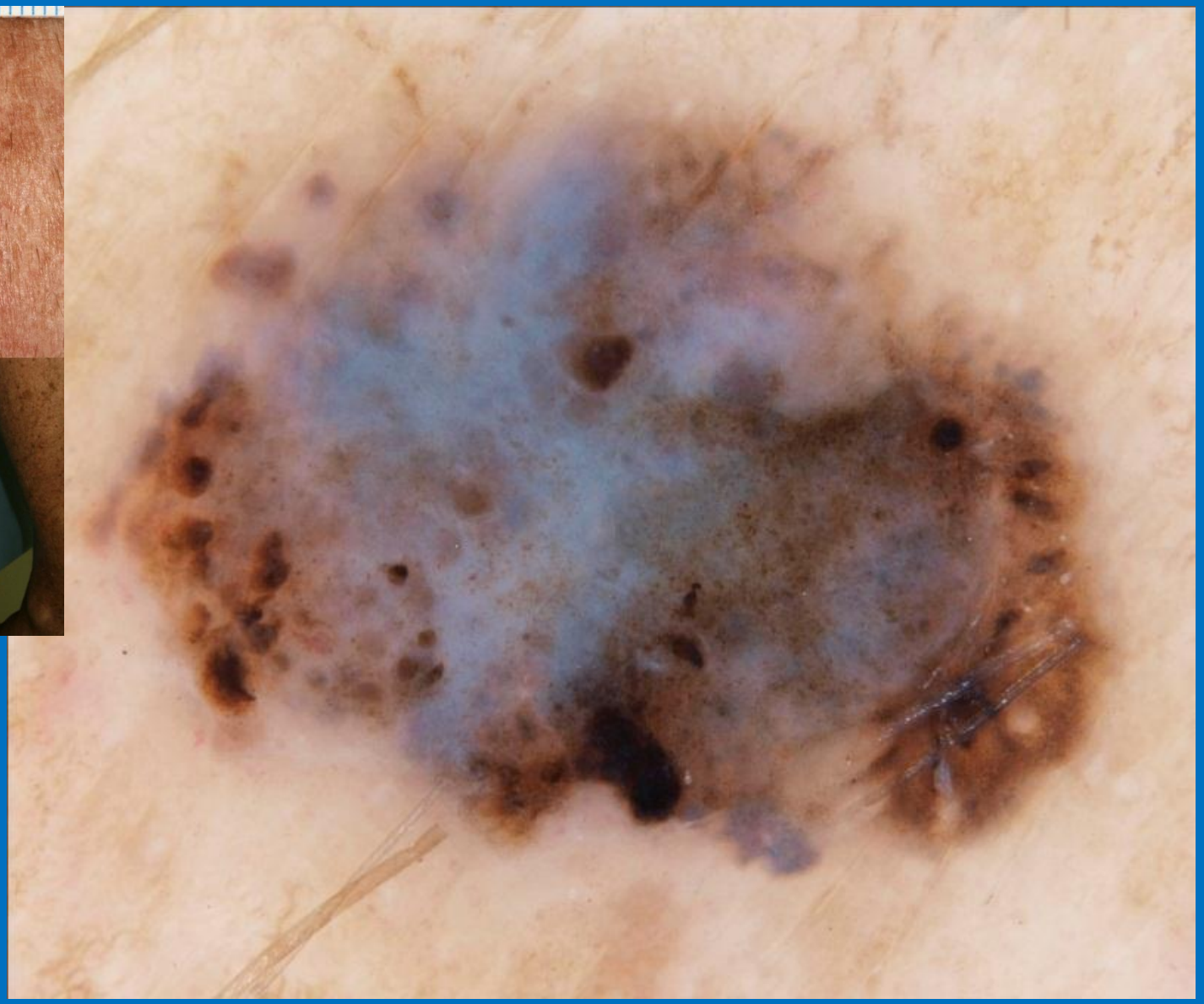
4. Black dots or clods, peripheral



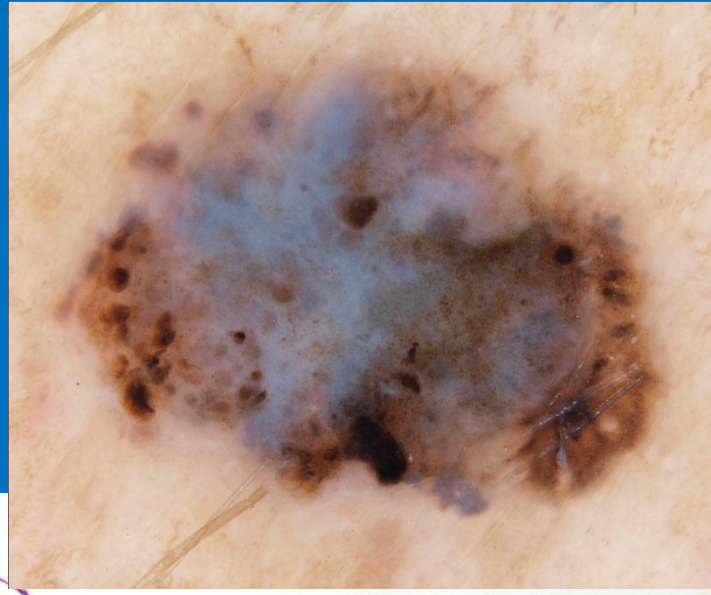


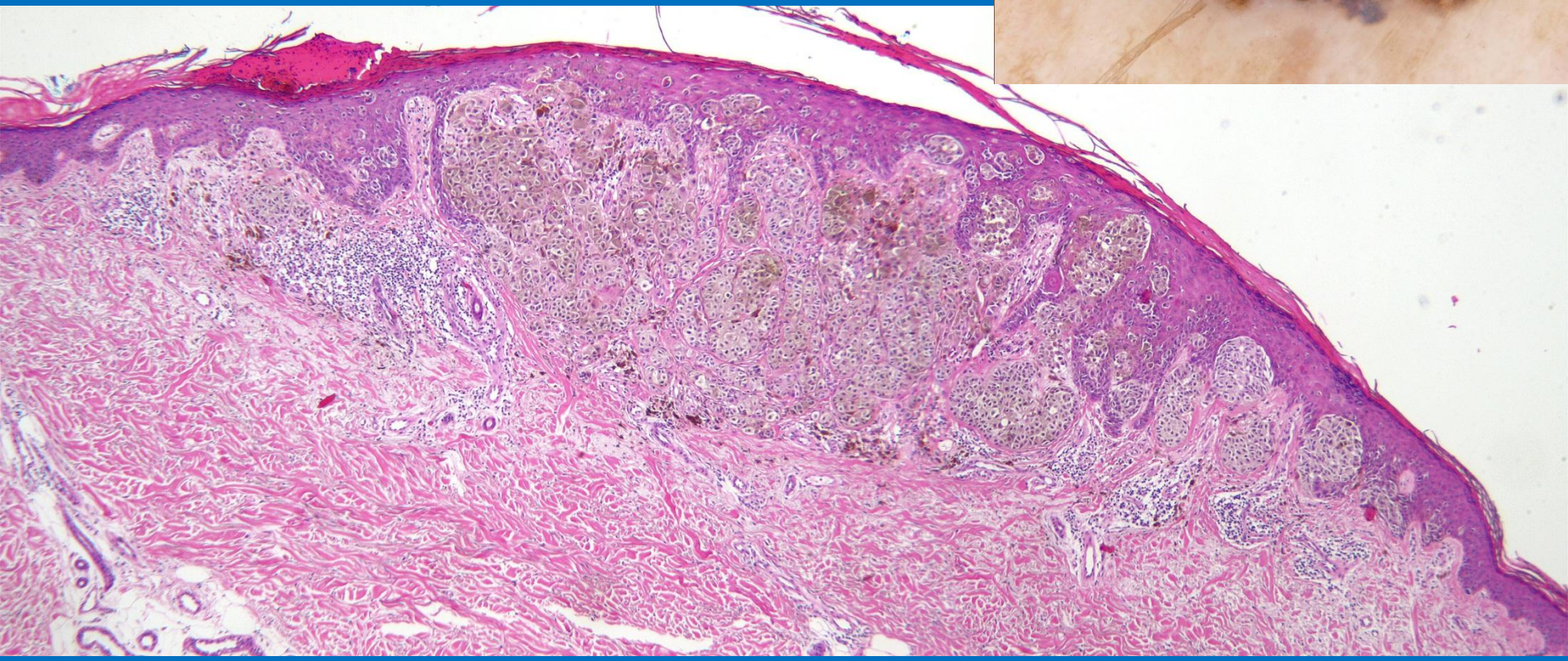
A new pigmented lesion on a 40 year-old can be a seborrhoeic keratosis, a pigmented BCC or a melanoma. A new naevus is not expected at this age. Chaos + Clue (peripheral black clods) is suspicious for malignancy. Lines reticular excludes BCC and there are no clues to seb K. **In-situ melanoma.**

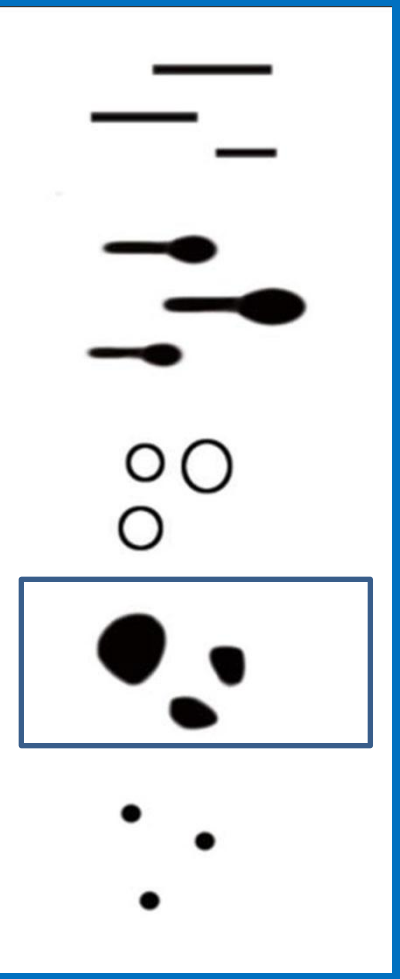




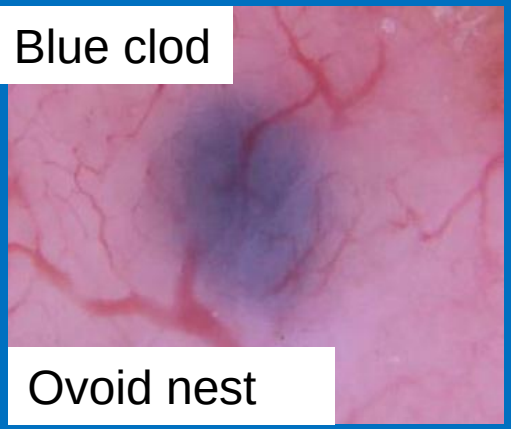
Black clods correlate with Pagetoid nests of pigmented melanocytes. Black can occur centrally in naevi when keratinocytes containing melanin move to the stratum corneum after irritation but black can occur anywhere in a melanoma. When it is peripheral it is a clue to malignancy.







Blue clod

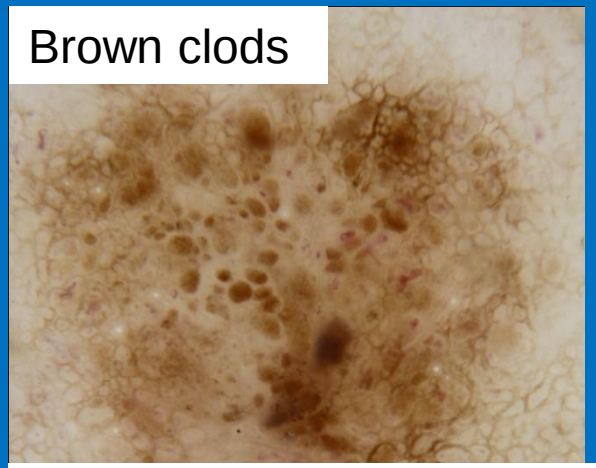


Ovoid nest

Orange clods

Cobblestones

Brown clods



Aggregated brown globules

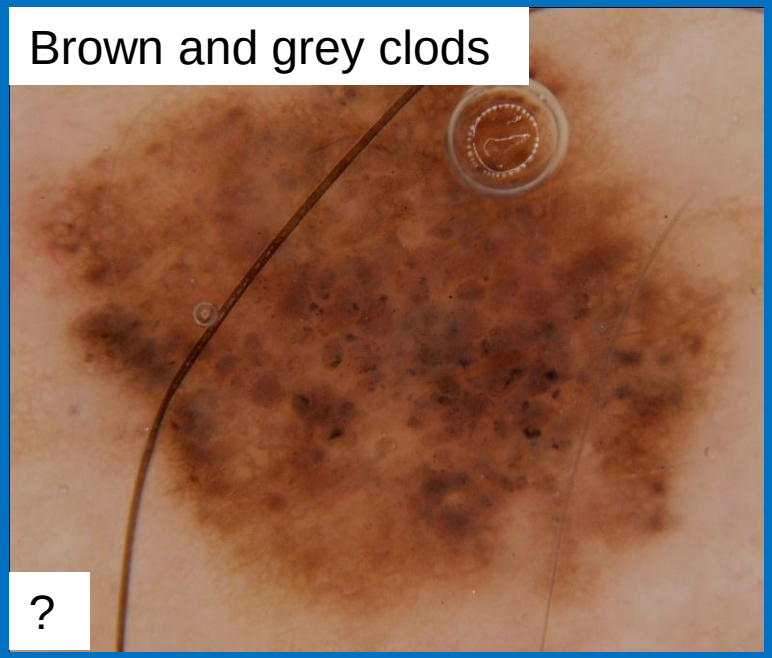
White clods

Milia like cysts

Red clods

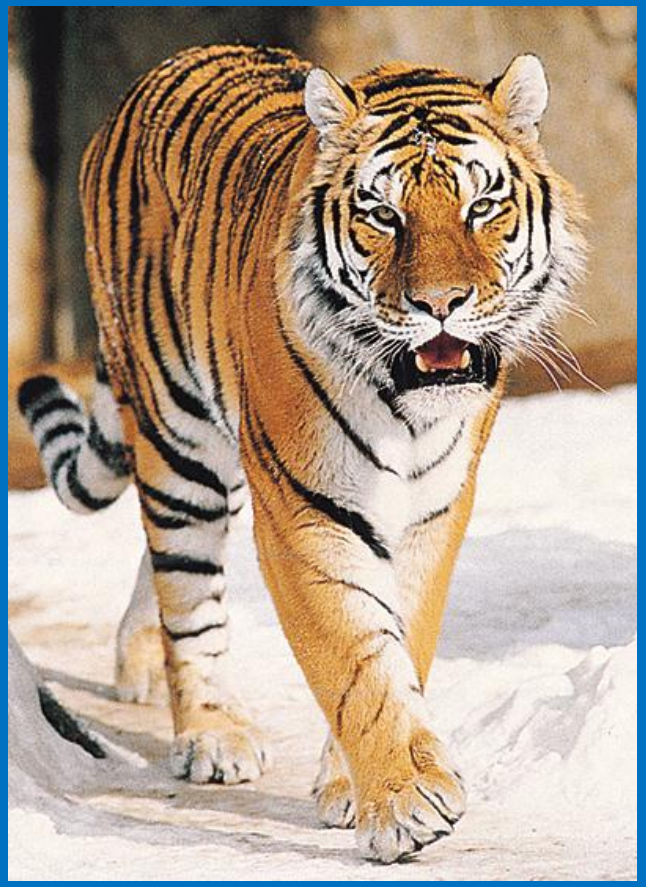
lacunes

Brown and grey clods

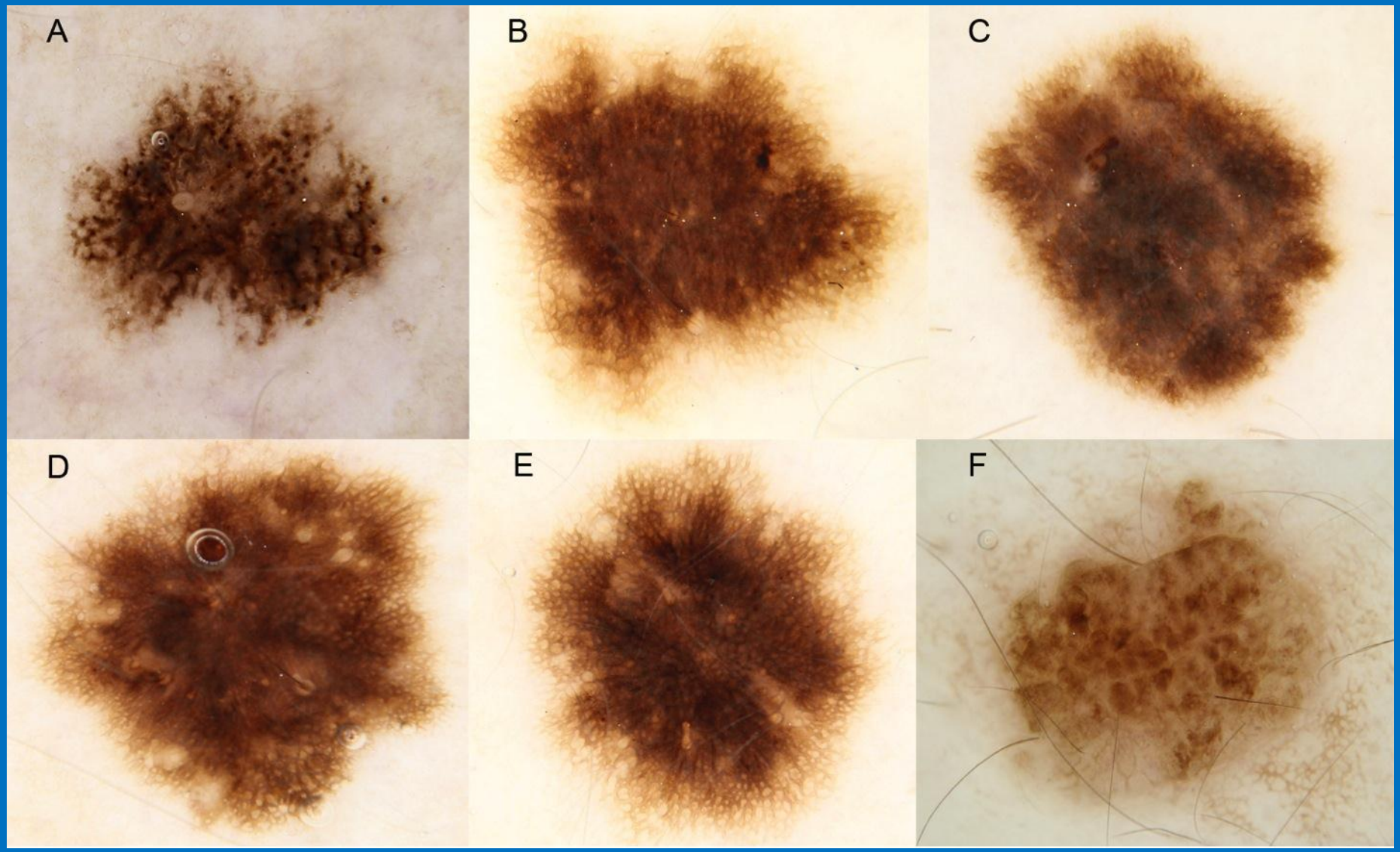


?

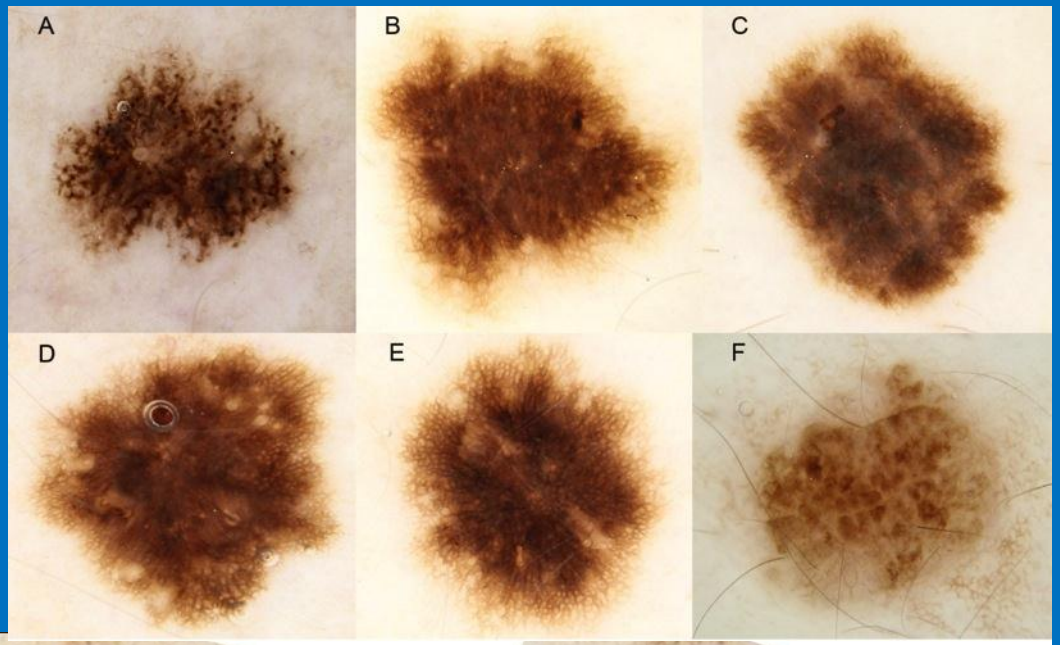
Varieties of clods. Why should they all have different (metaphoric) names which are diagnosis-dependent? The last has chaos + grey and is a melanoma. If you called it a cobblestone pattern you may be lead astray.

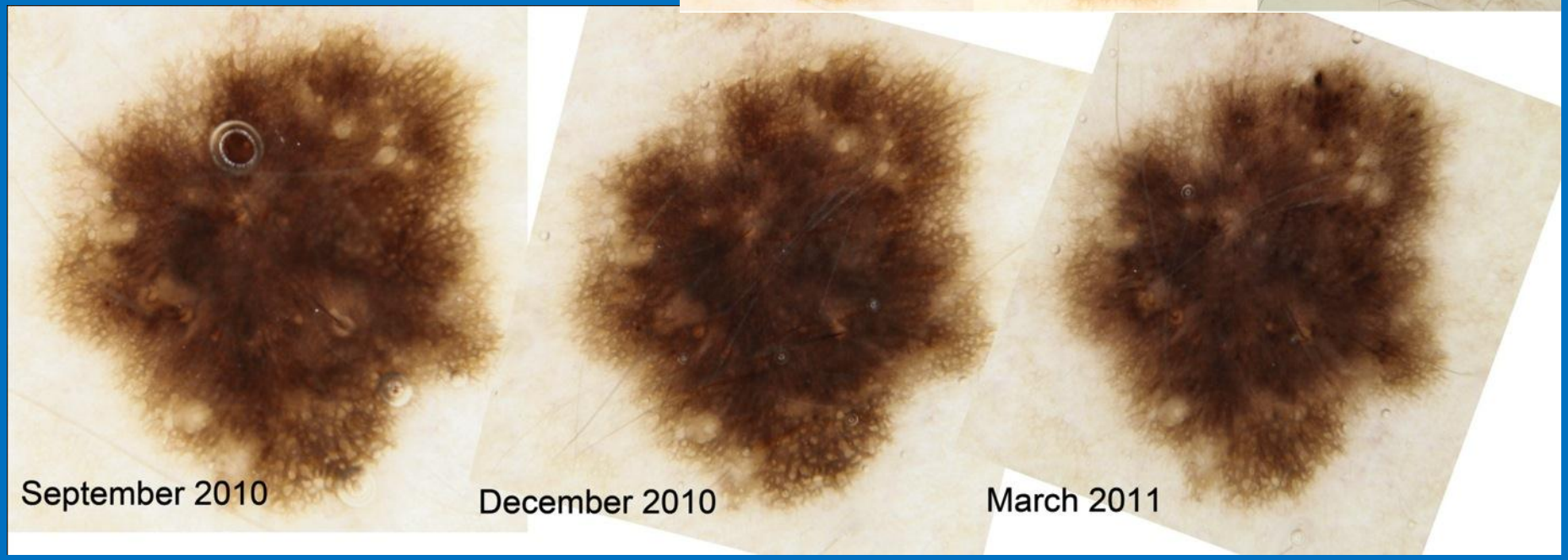


Can you pick by *dermatoscopic* morphology which naevus will have a melanoma arise within it within 6 months?

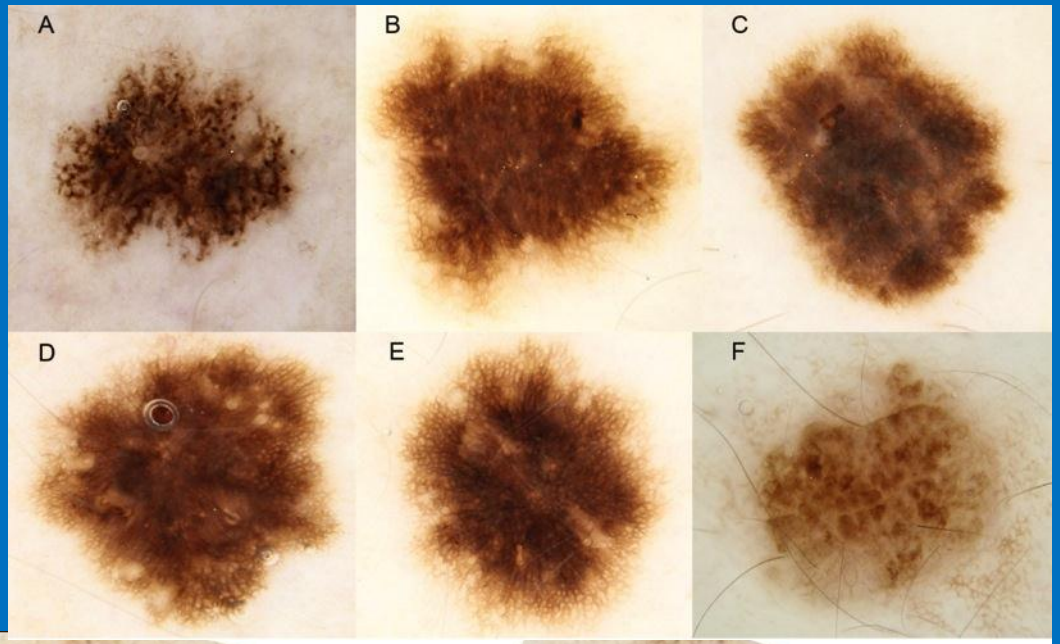


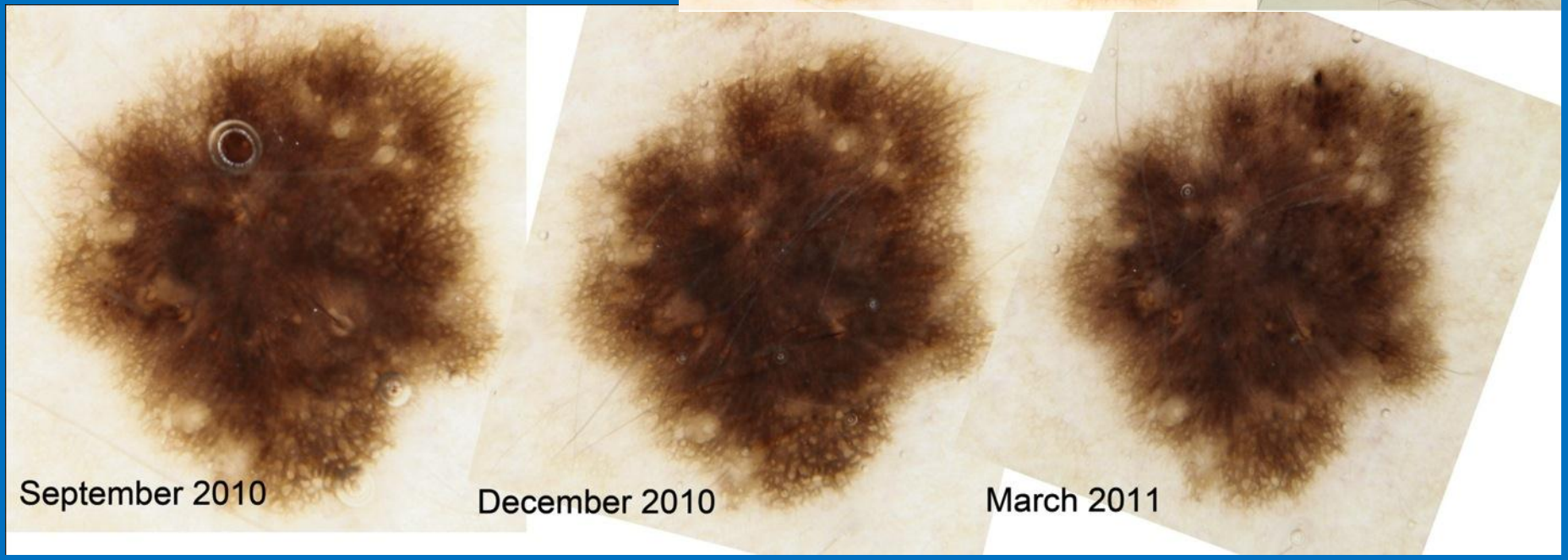
Lesion D, arguably the least “atypical”, has developed a peripheral black dot. By definition, when a defined clue to malignancy is present asymmetrically it produces chaos, therefore chaos and clue are produced by the same structure. This was an in-situ melanoma arising in a naevus.



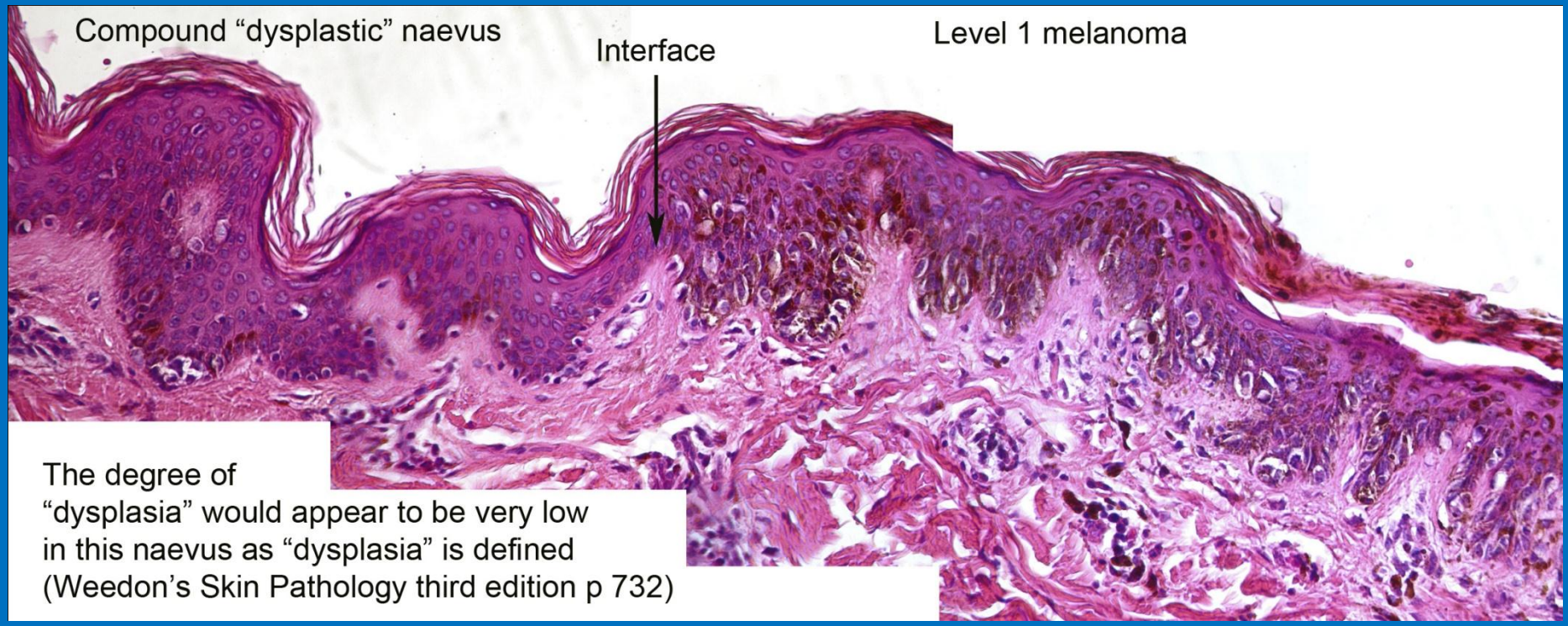


Can you pick malignant potential by degree of clinical “atypia”?



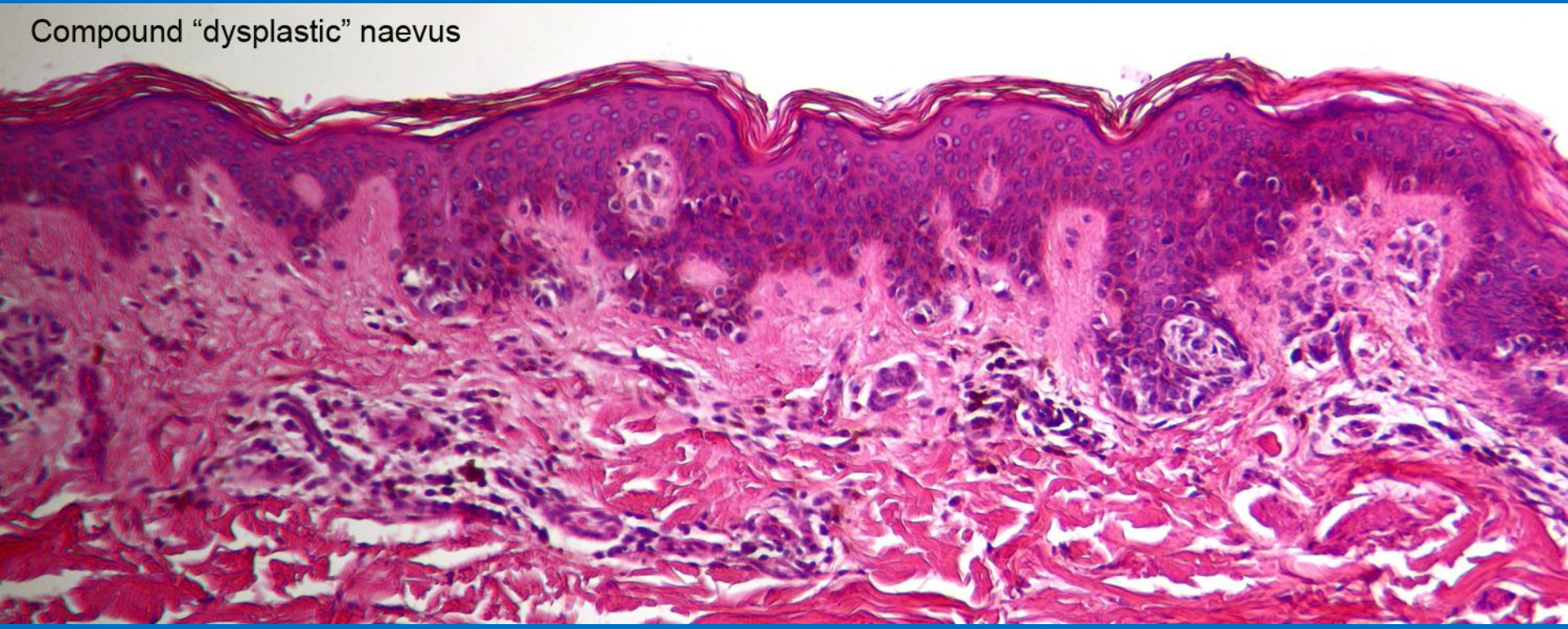


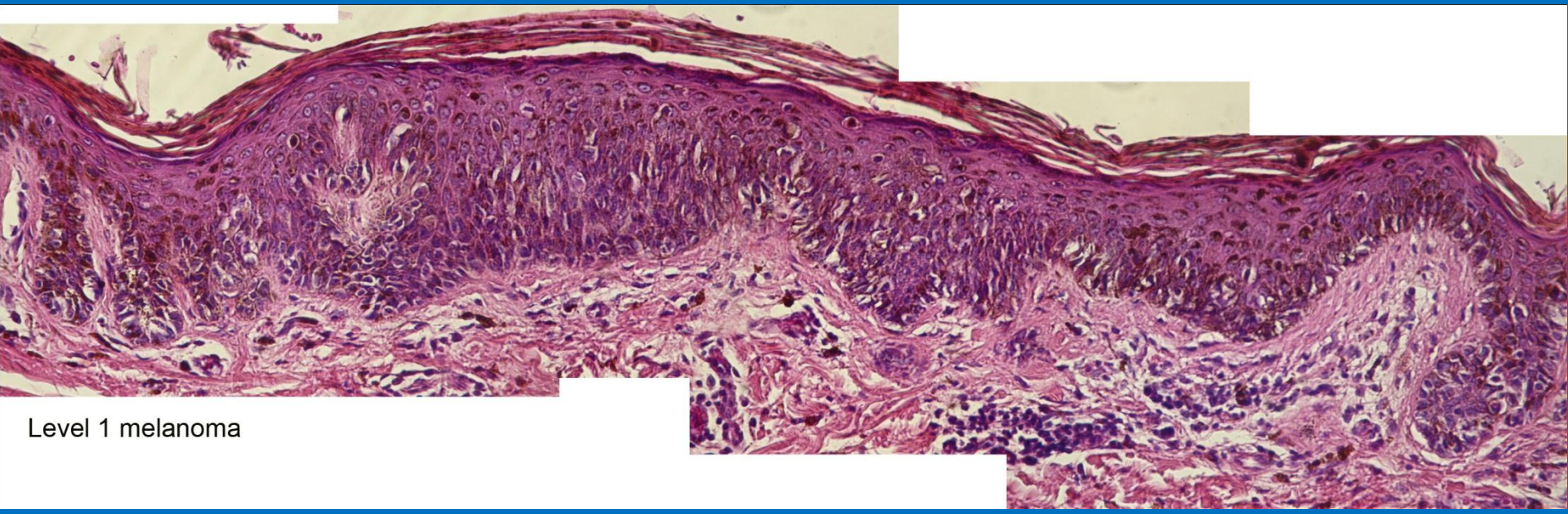
The lesion which had a melanoma arise within it is arguably the least atypical in this series of randomly monitored lesions from one patient.



Similarly a melanoma is not more likely to arise from a “more severely” dysplastic naevus. A “severely dysplastic” naevus may actually be a melanoma. **The use of the term “dysplastic” may actually express the degree of uncertainty of the pathologist** rather than telling anything prognostically useful about the lesion.

Compound “dysplastic” naevus

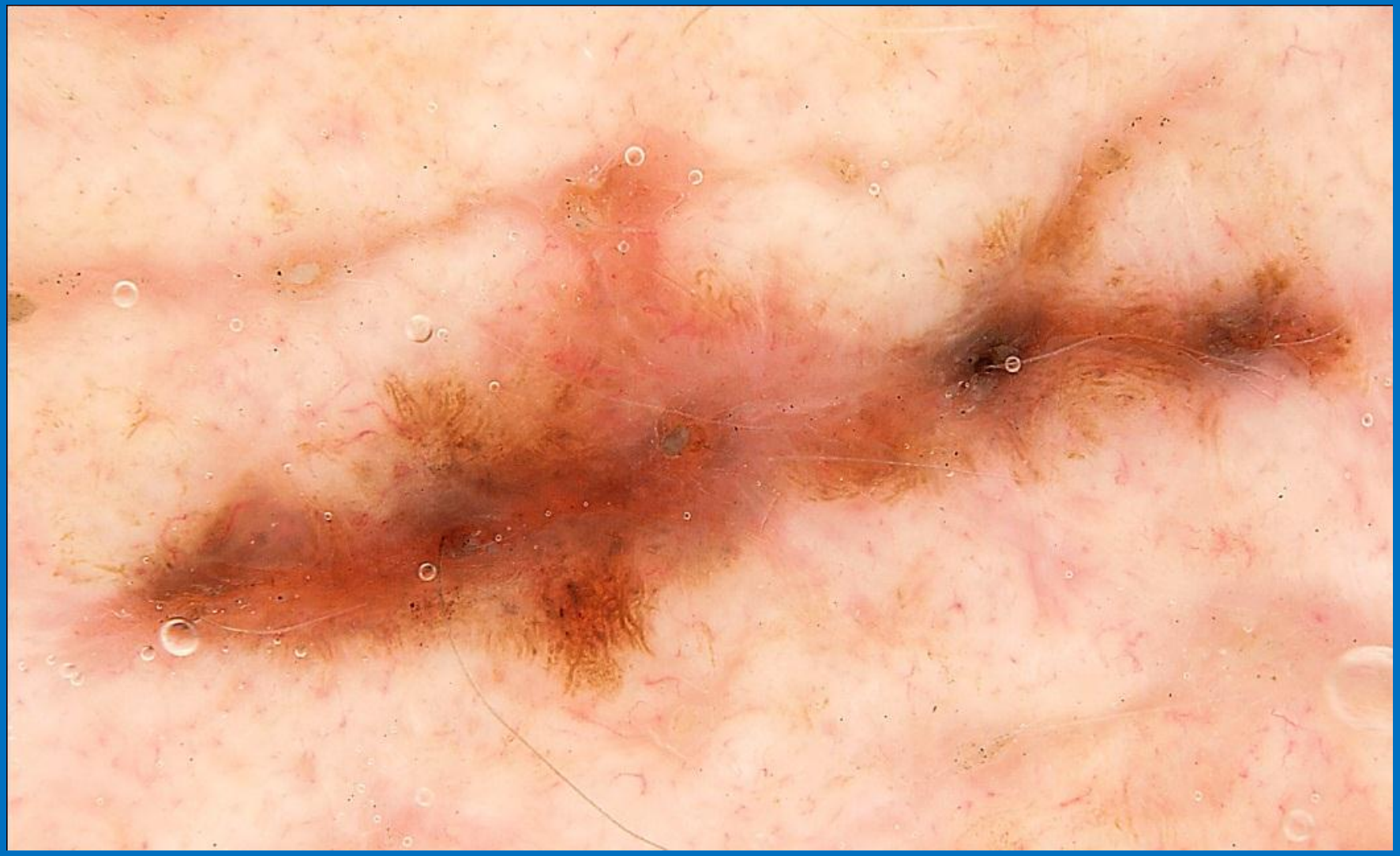


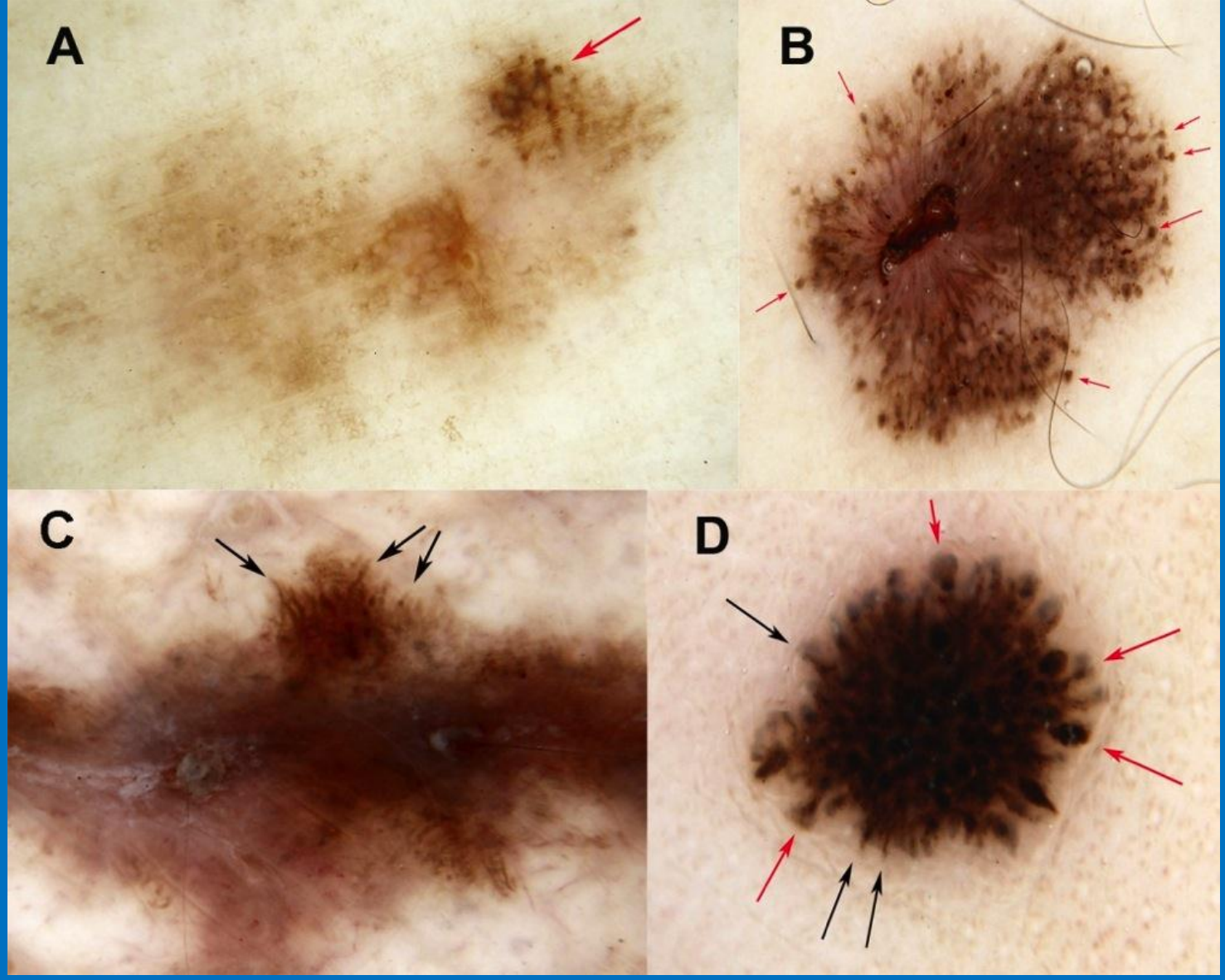


Level 1 melanoma

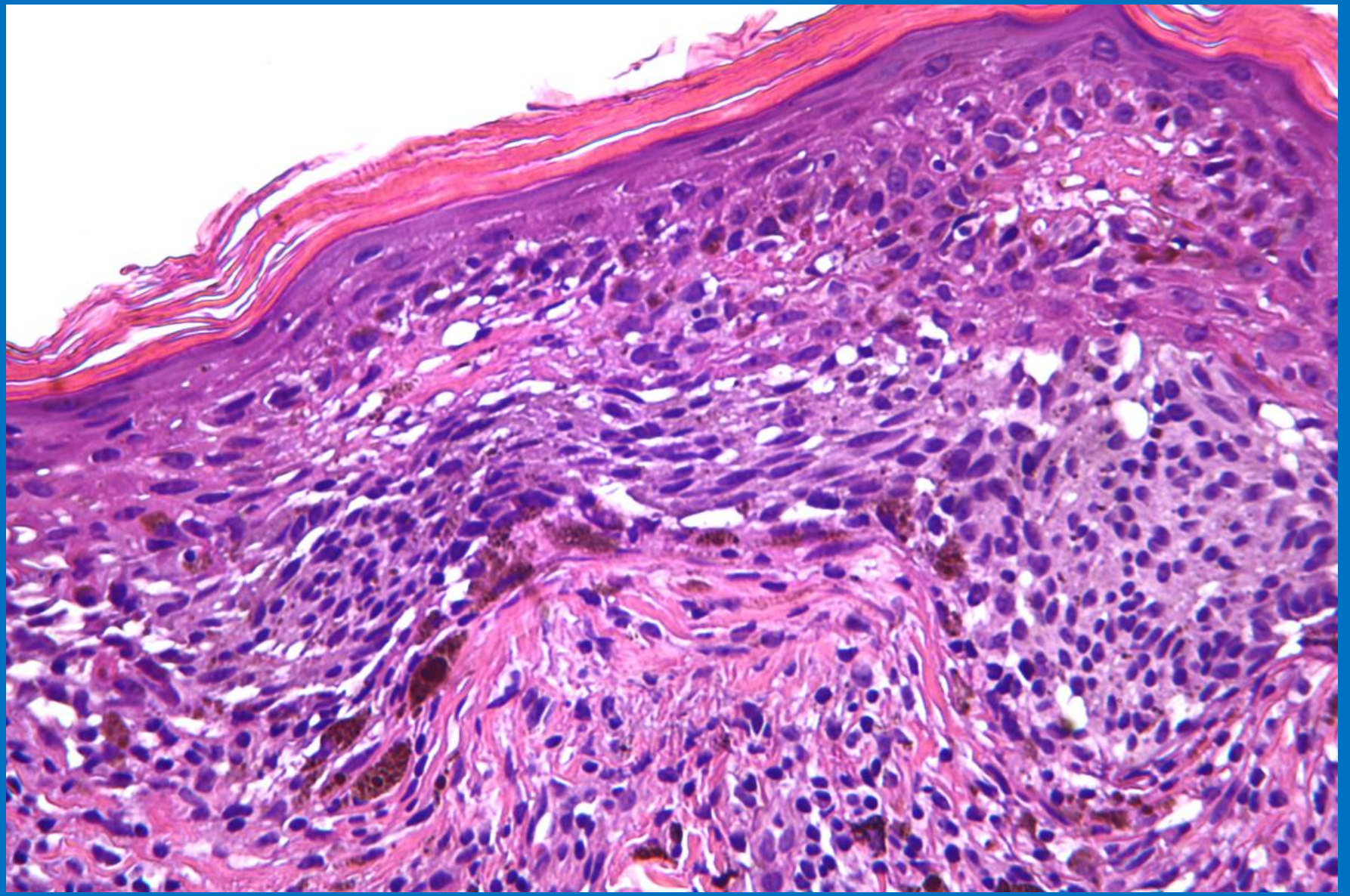
Degree of cytological dysplasia has NO association with risk of development of malignancy. Melanomas develop in clear skin or naevi of any type. If a lesion is reported as “severely dysplastic” it may already be a melanoma.

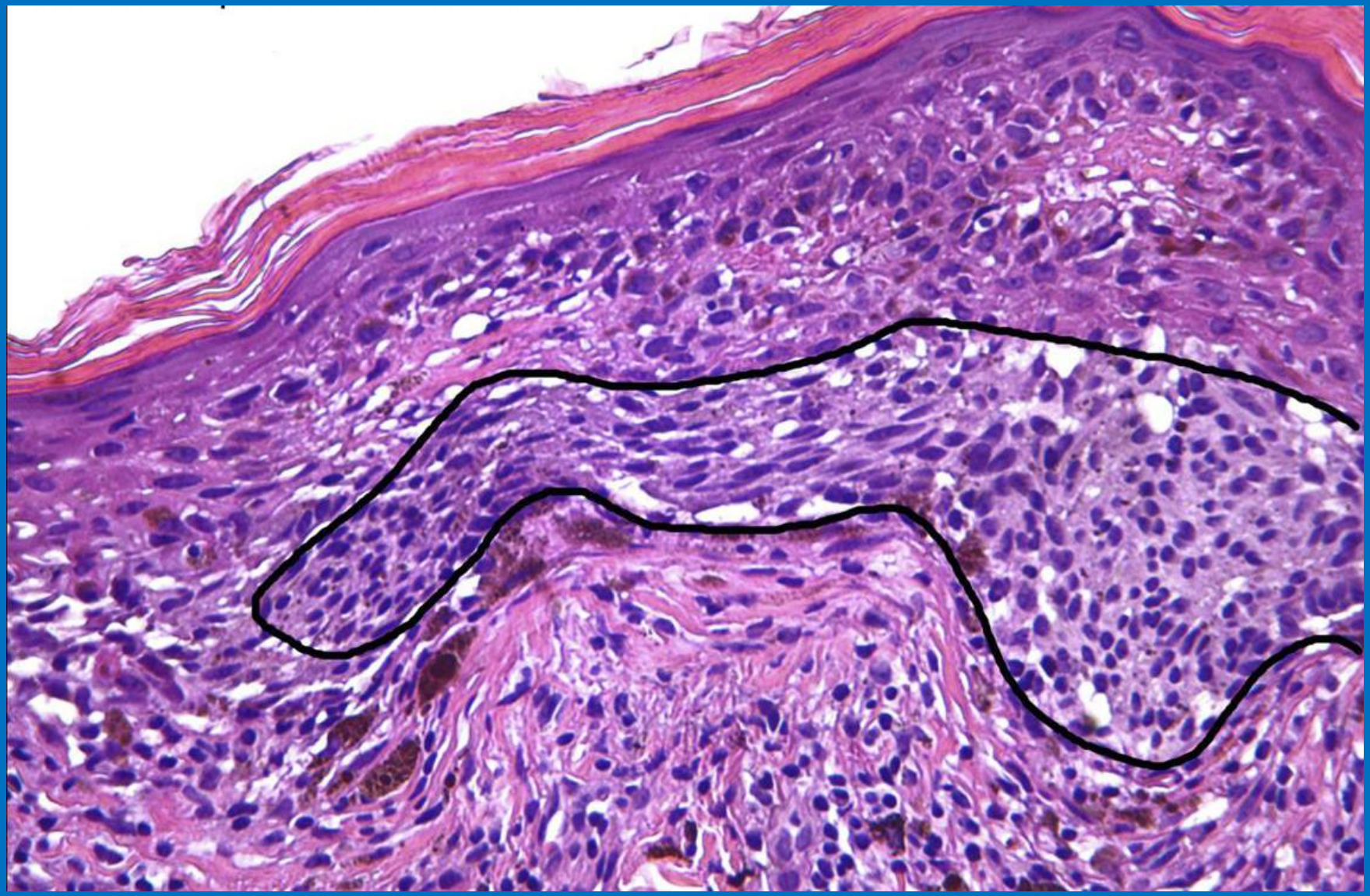
5. Lines radial or pseudopods, segmental



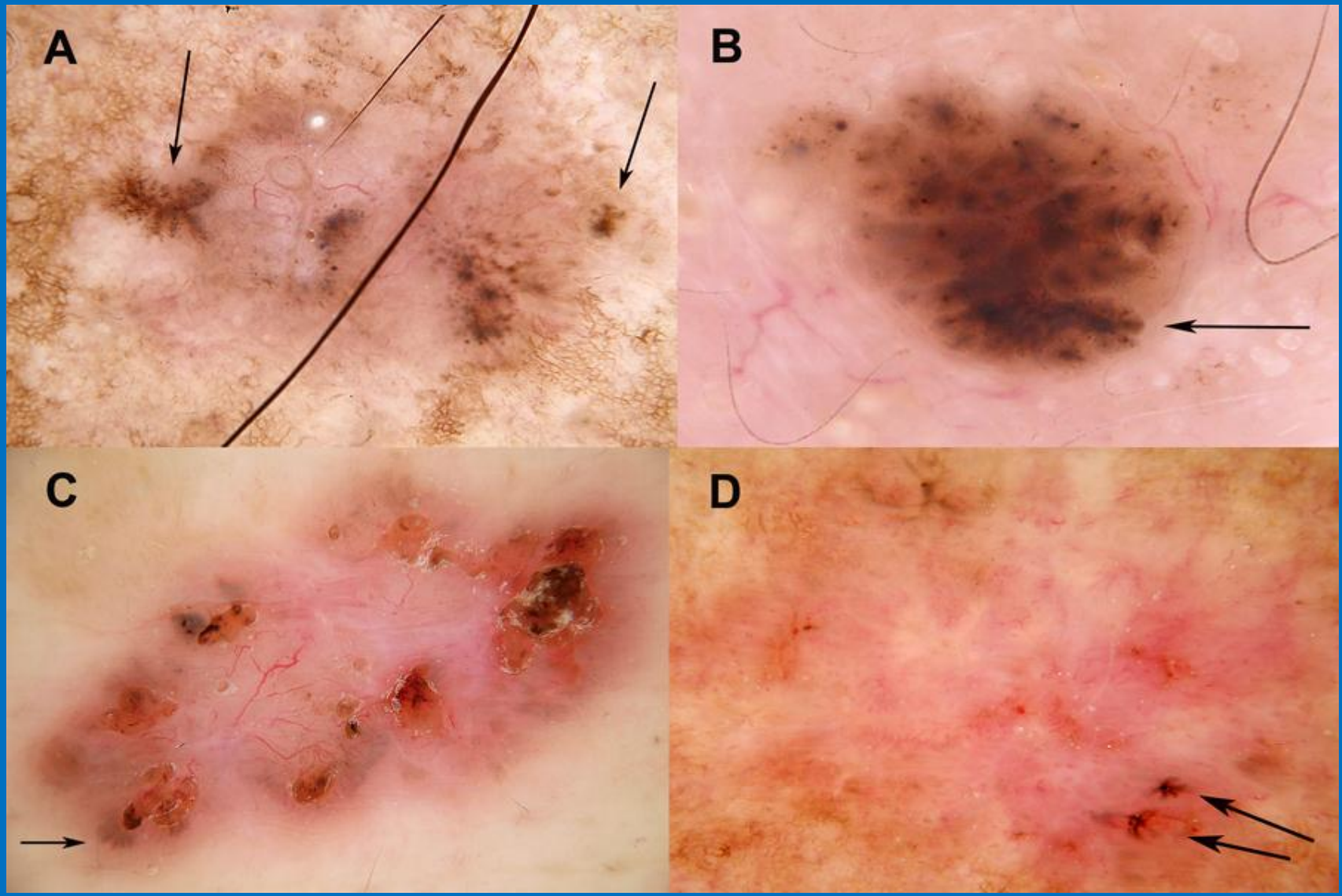


Segmental radial lines are a clue to malignancy. A and C are both melanomas. Circumferential radial lines may occur in benign lesions. B is a recurrent naevus following punch biopsy of a Clark naevus and D is a Reed naevus. Partial biopsy of a naevus risks miss-diagnosis. We advocate excision of all Spitzoid lesions, especially in adults.

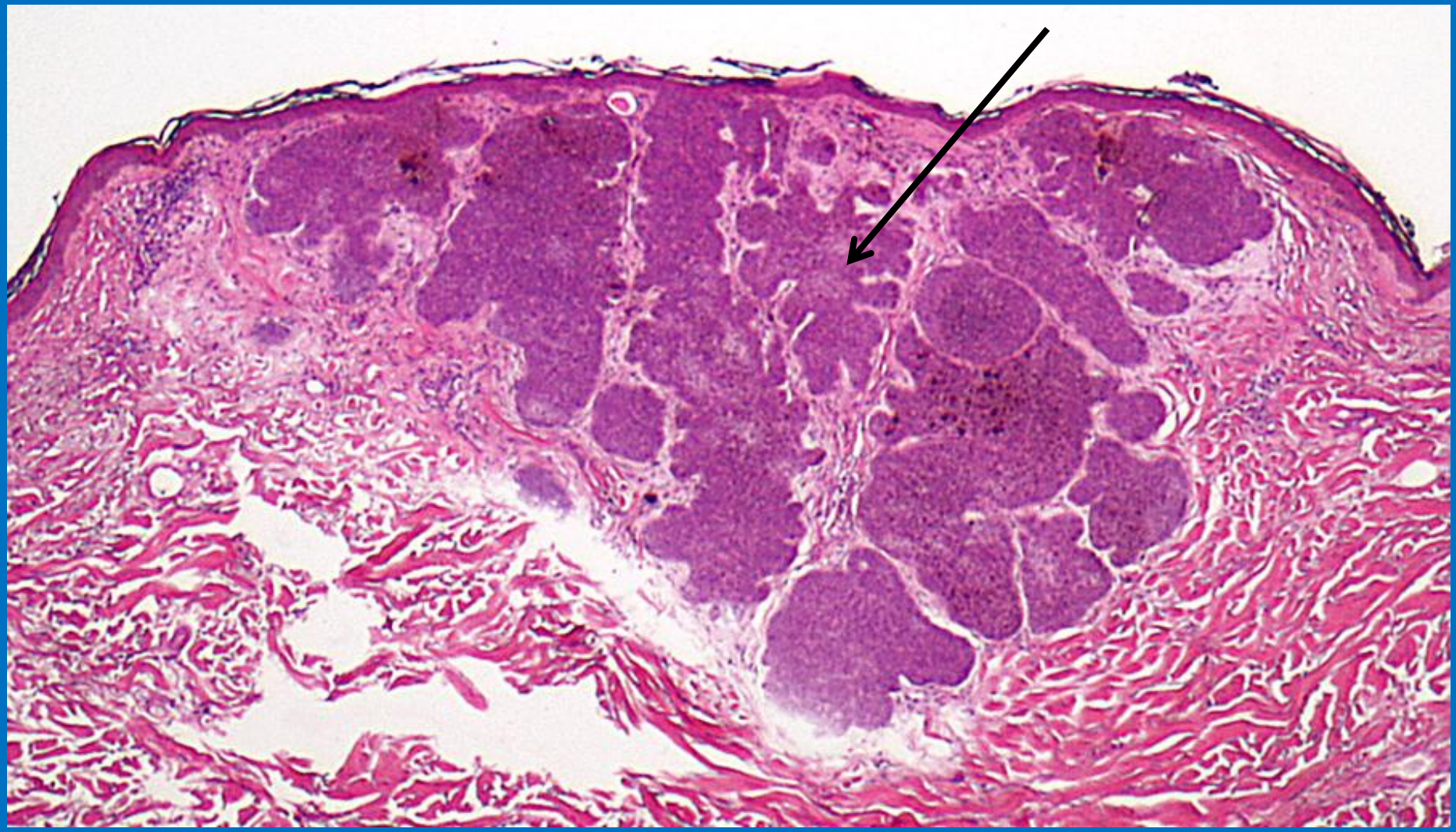




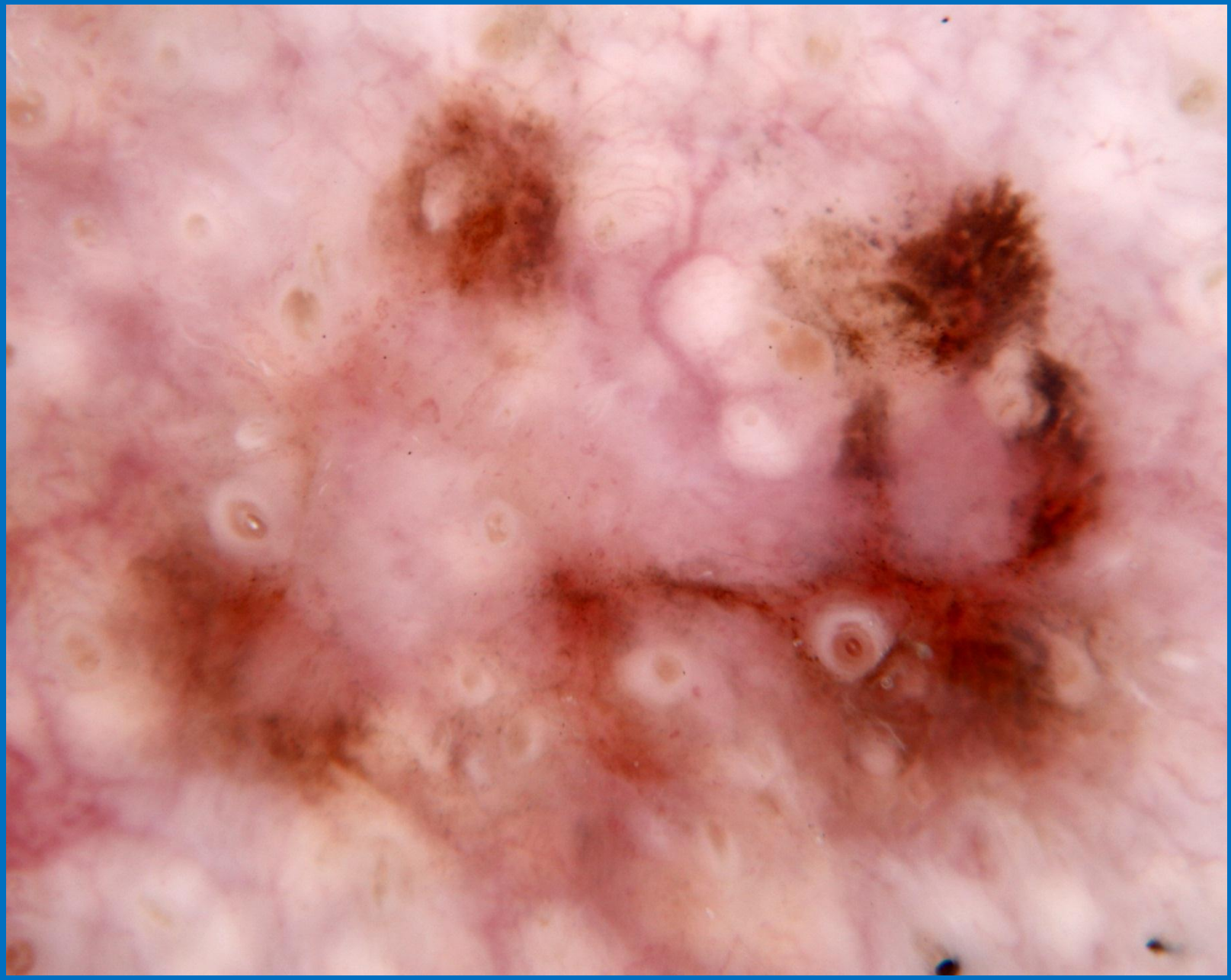
This shows a radial line in a melanoma sectioned longitudinally. This lesion was originally signed out incorrectly as a naevus. Note the pleomorphism of the melanocytes.

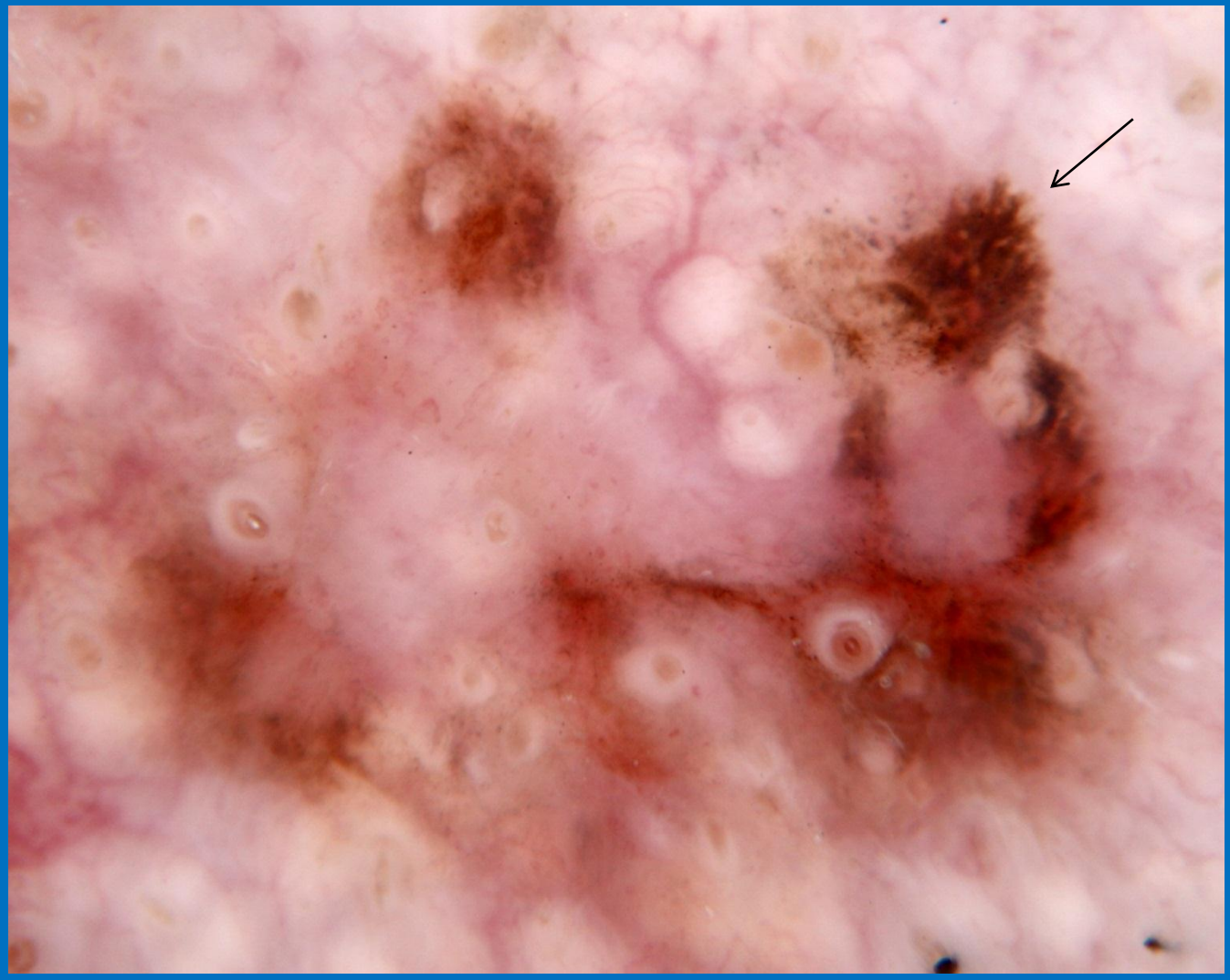


Radial lines (peripheral segmental [A,B,C] and central [D]) are also a clue to pigmented BCC but in BCC they “converge” either to a central point (most examples above) or to a line (A, left hand side)



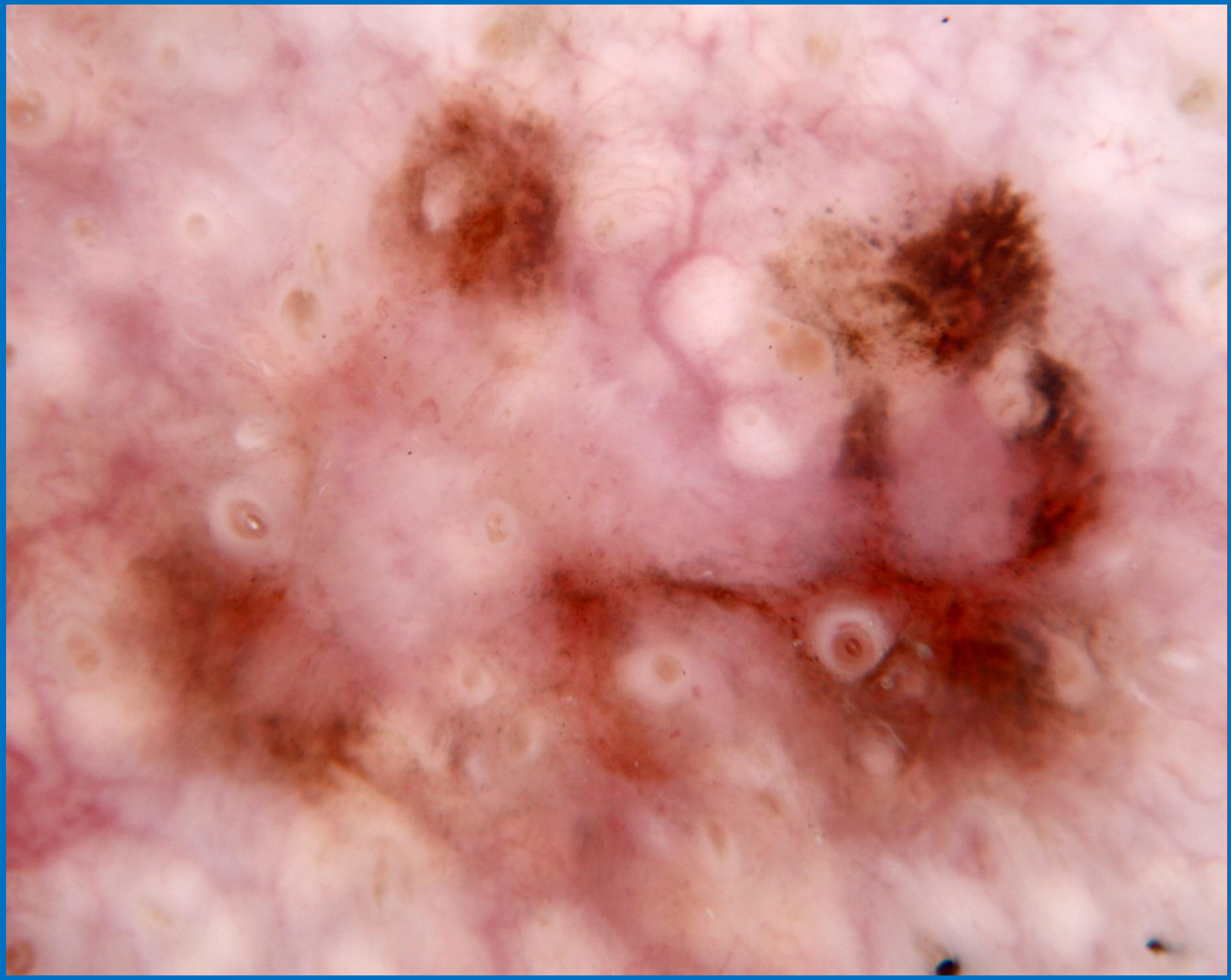
The dermatopathologic structure indicated above would correlate with dermatoscopic radial lines converging.



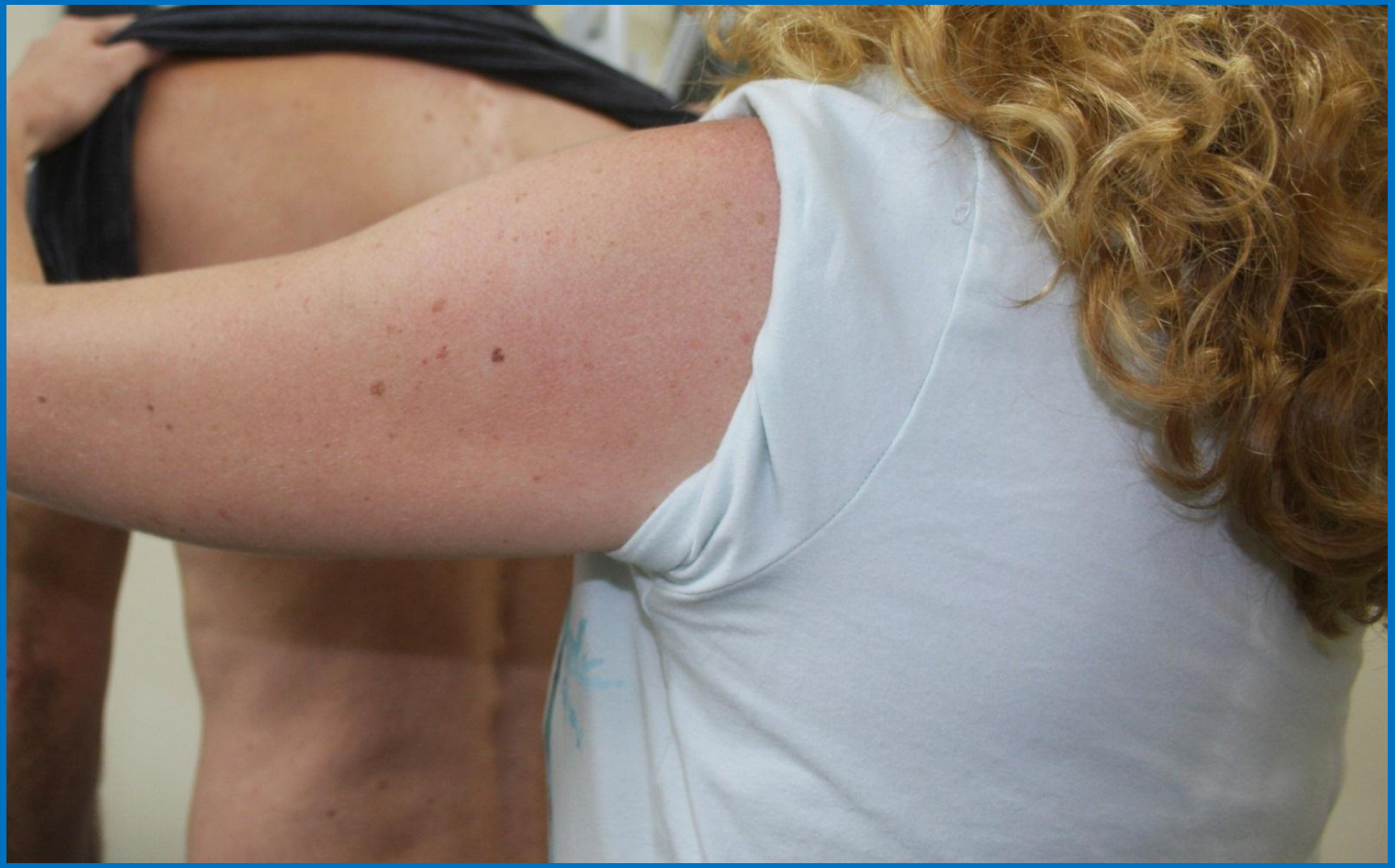


Chaos + Clue (radial lines segmental) predict suspicion of malignancy. Applying Revised Pattern Analysis, white circles are a clue to actinic keratosis/SCC. This is a pigmented SCC in-situ. Metaphoric terminology would predict melanocytic status due to “streaks”. Use objective-geometric, not metaphoric, terminology!

OBJECTIVE DESCRIPTION SHOULD PRECEED DIAGNOSIS!



Only the dermatopathologist can see melanocytes!

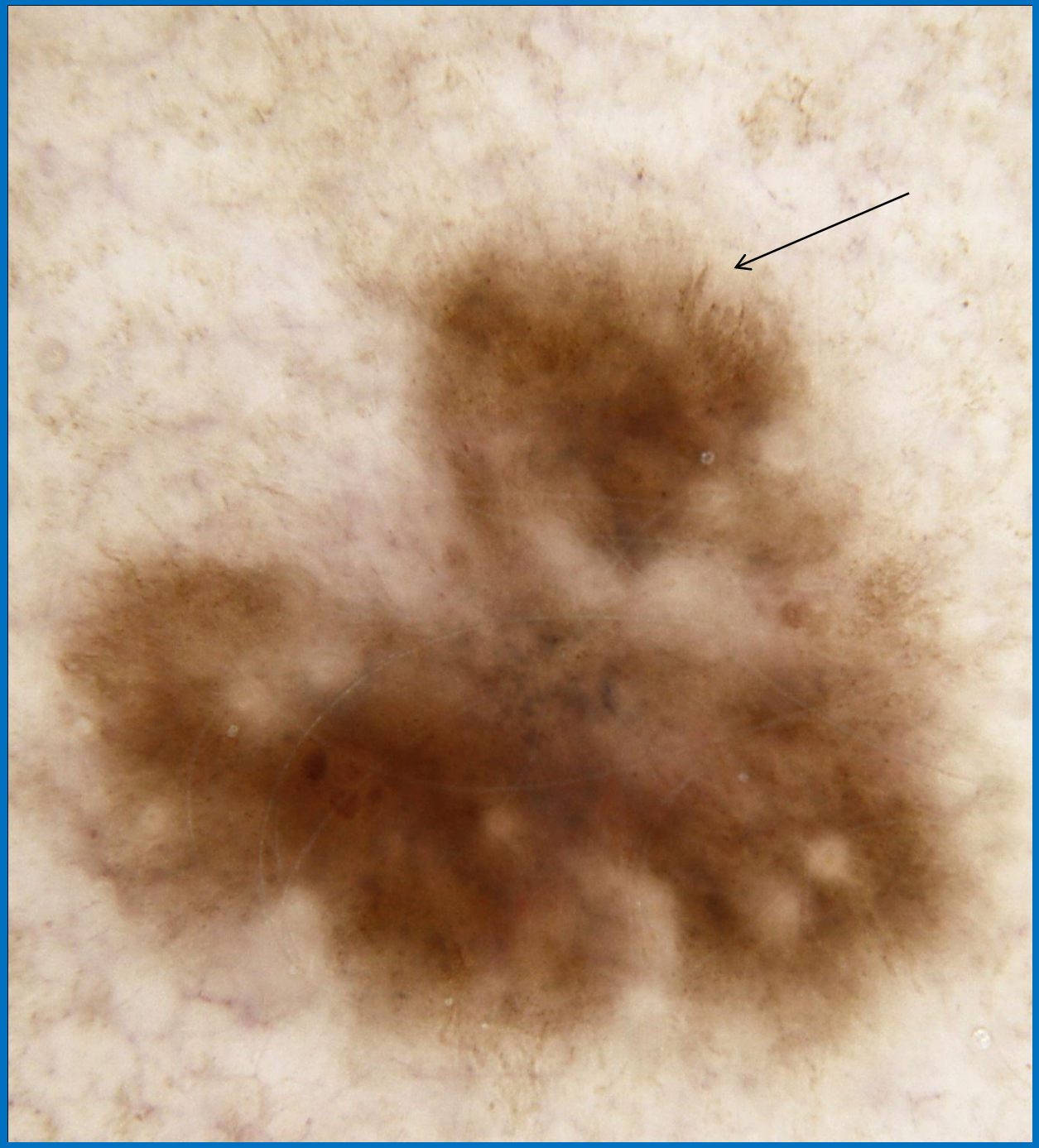


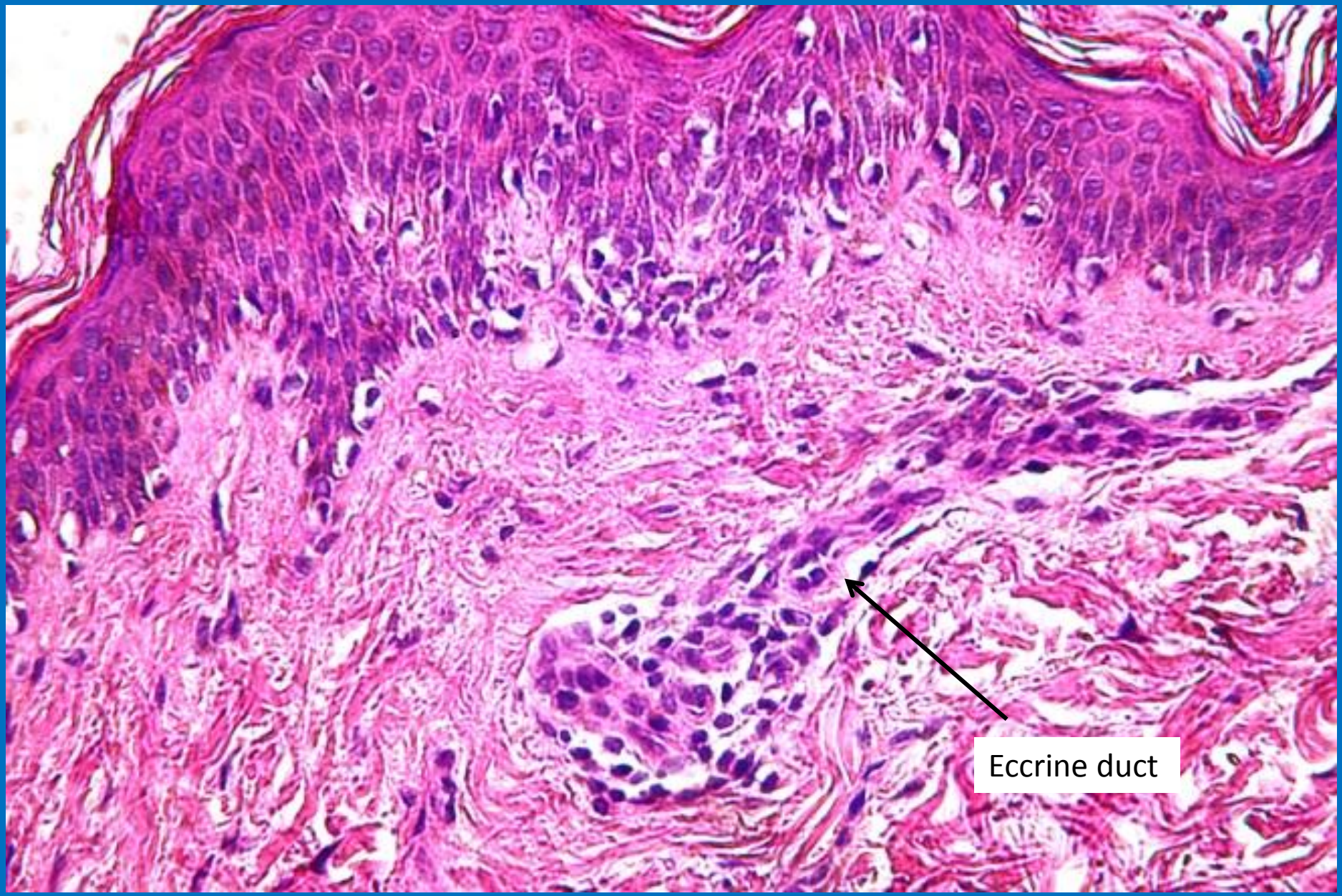
This 31 year-old lady is attempting to show something to the doctor on her husband's back. The heart-shaped lesion on her arm is exposed and it "breaks the pattern" in a subtle way because of its shape. This prompts dermatoscopic assessment.

Chaos + Clue (grey dots) predict suspicion for malignancy. This is an indication for excision biopsy but the clue of grey dots while being a very sensitive clue (present in most melanomas) is not highly specific.

Any additional clue (in this case lines radial segmental) greatly increases the specificity.

Melanoma was predicted in this case with a high level of confidence.

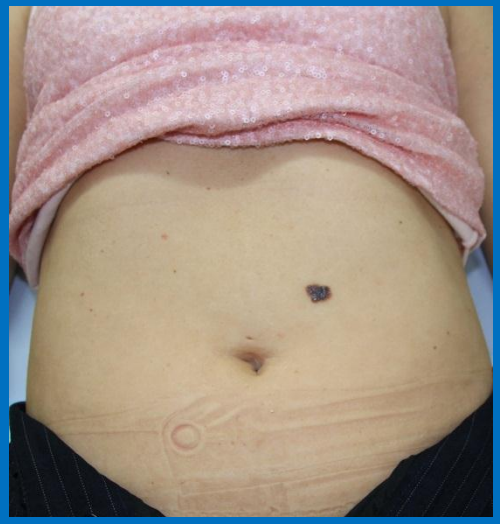


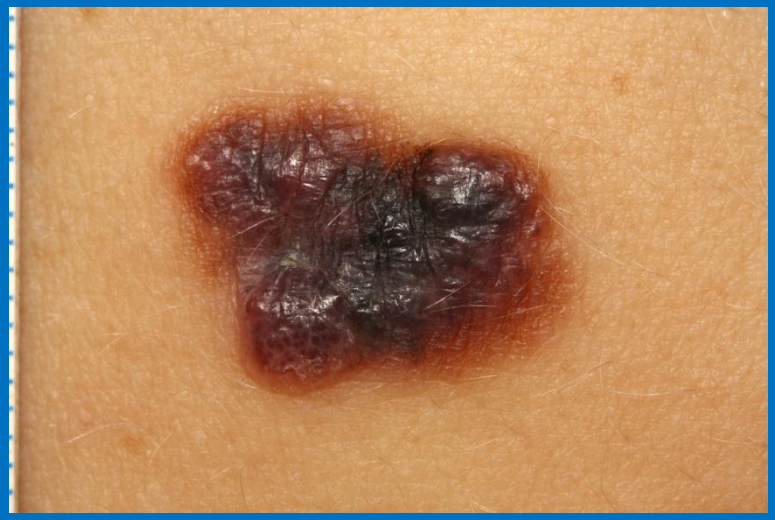


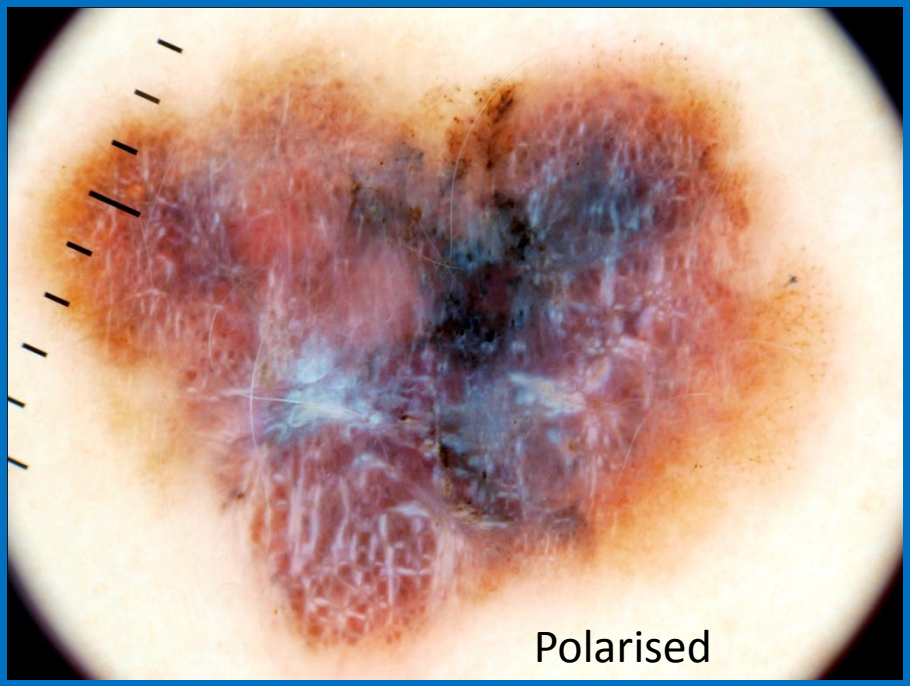
Confluent junctional and Pagetoid atypical melanocytes in an in-situ melanoma

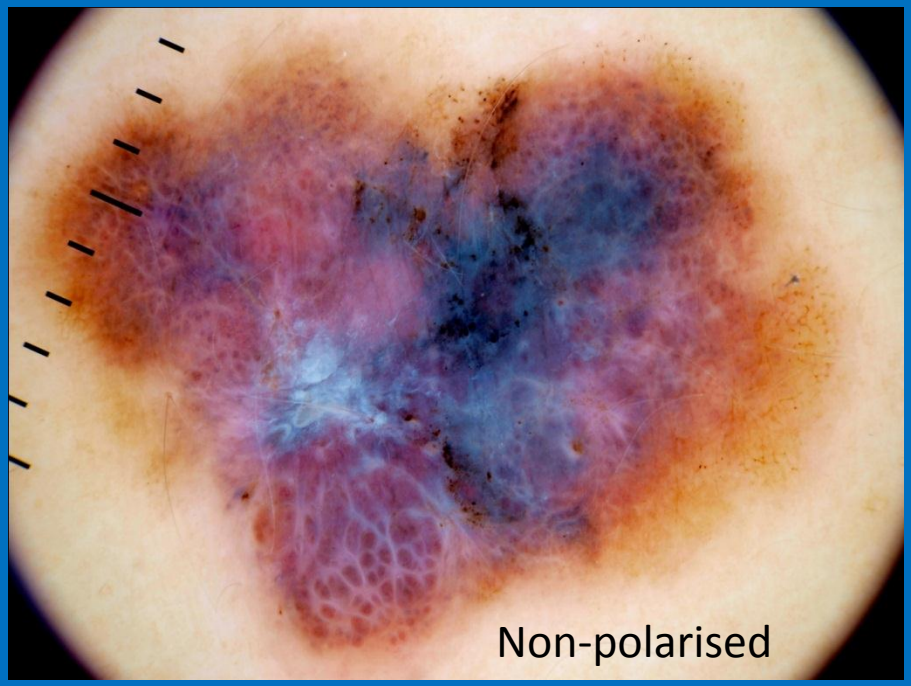
6. White lines

31 year old lady

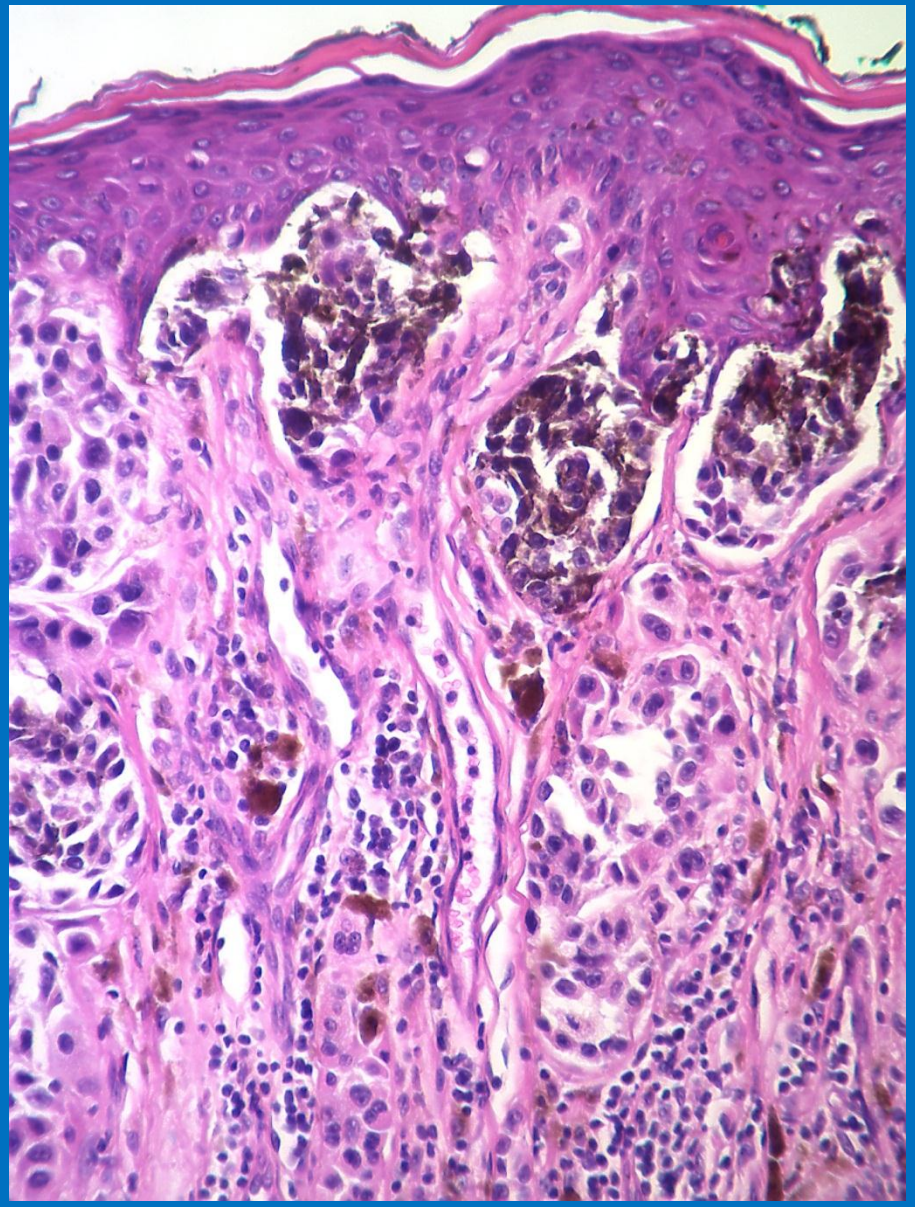








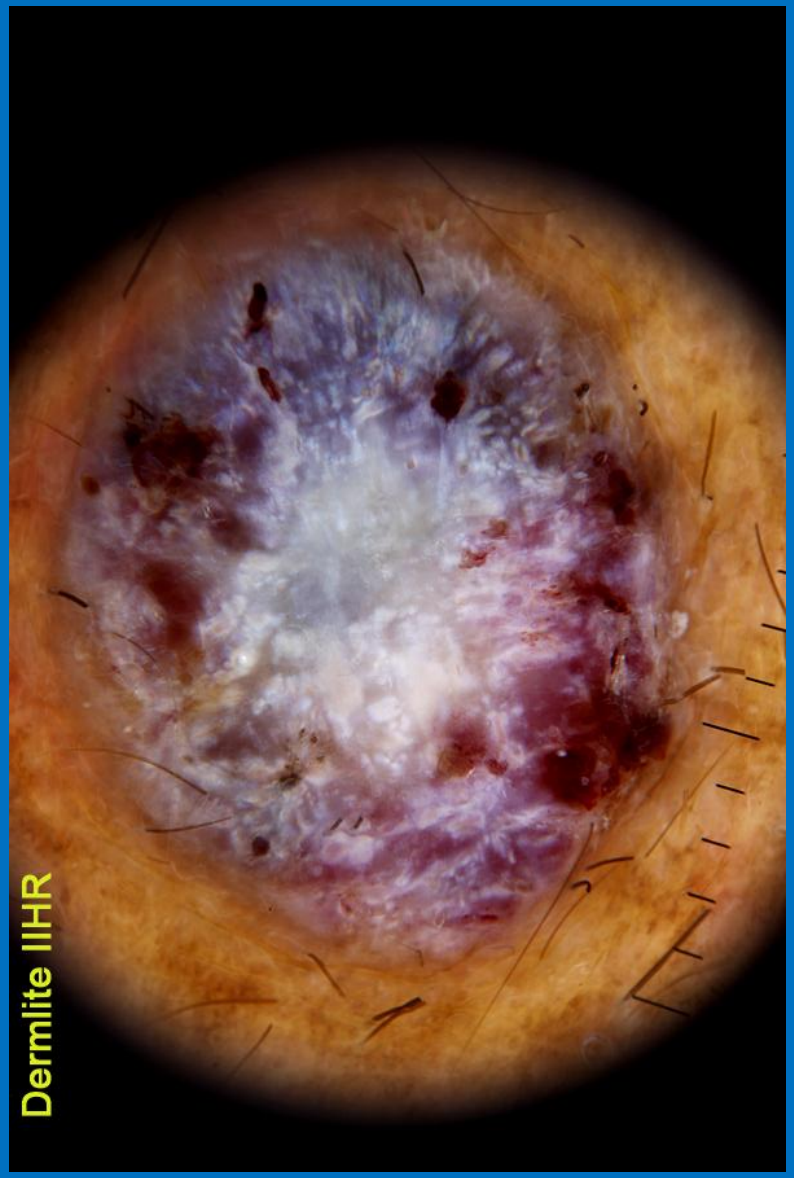
This lady visiting Australia from Poland is the same age as the lady in the previous case. Her melanoma has not been detected so early. Is shows multiple clues including the clue of polarising -specific white lines correlating with reticular white lines with non-polarised dermatoscopy. Both are a clue to malignancy.

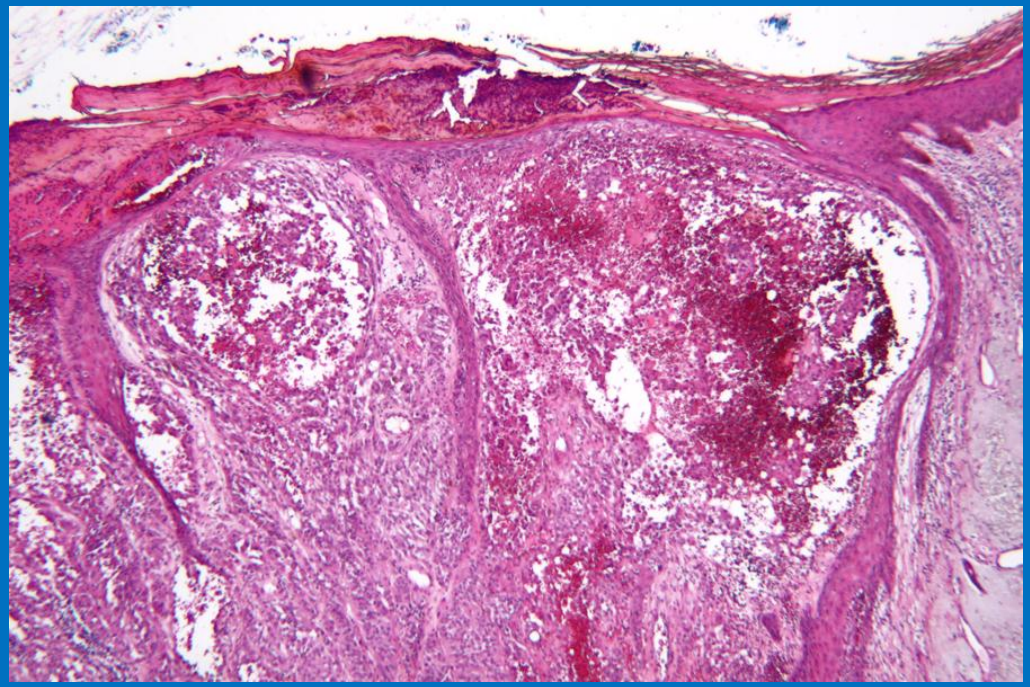


Dermatoscopic polarising-specific white lines appear to correlate with vertical bands of collagen dermatopathologically.

We speculate that this represents melanocyte induced fibroblast activity and that the collagen is in effect scaffolding prepared for a rapidly growing tumour

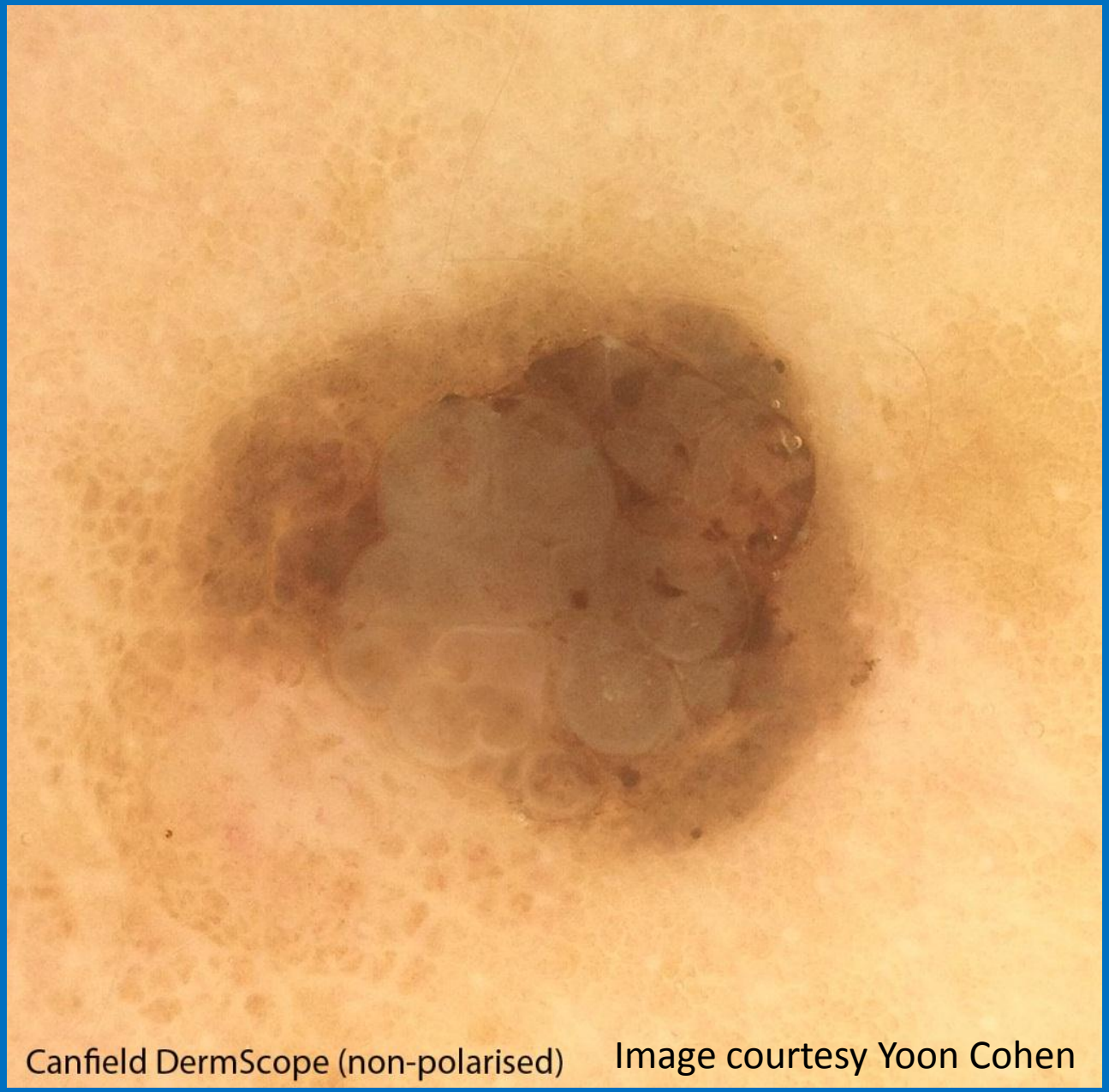
[24]

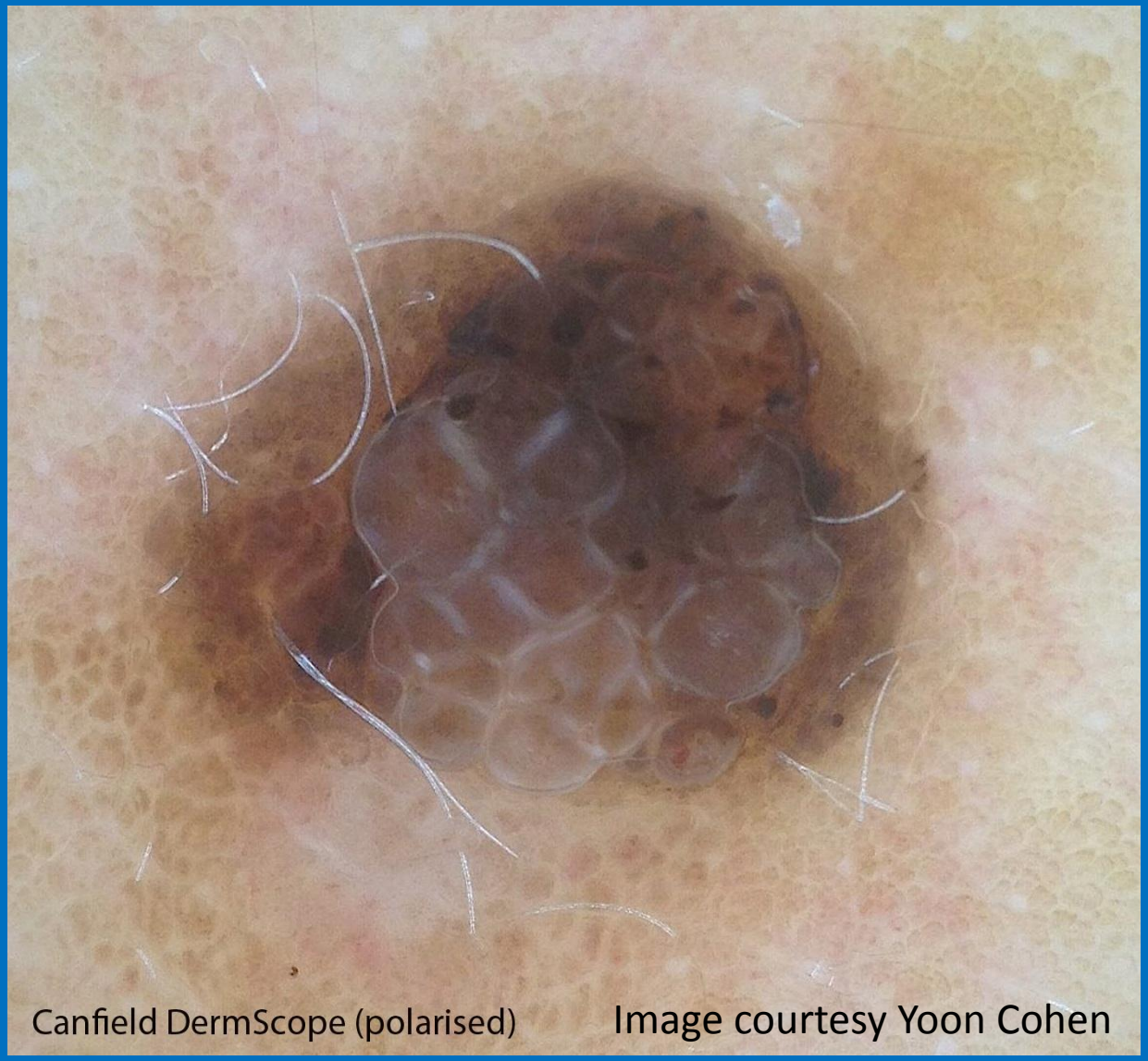




Another nodular melanoma which grew to a Breslow thickness of 5mm in 6 weeks. Dermatoscopic polarising-specific white lines correlate with vertical bands of collagen dermatopathologically

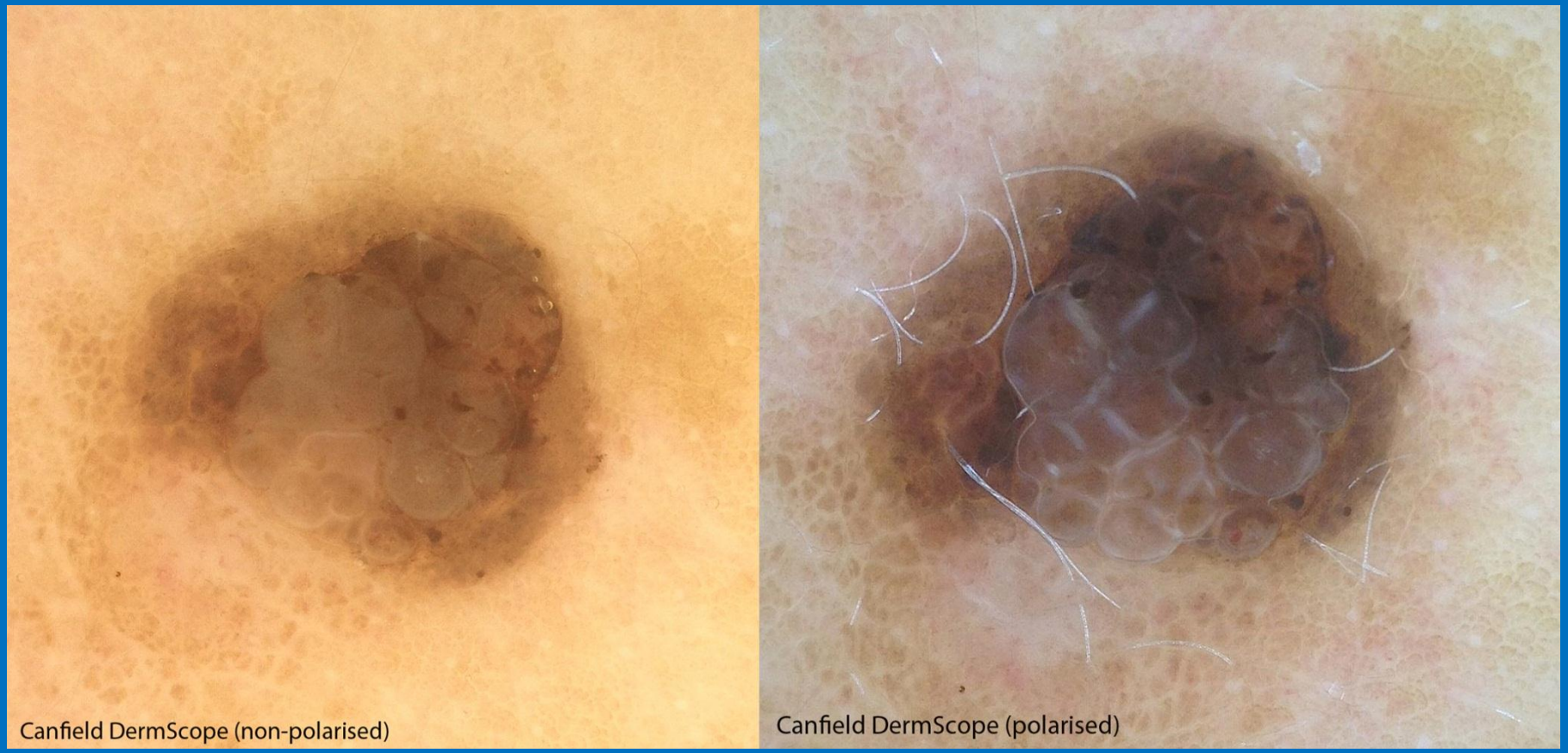
[25]


Canfield DermScope (non-polarised)
Image courtesy Yoon Cohen



Canfield DermScope (polarised)

Image courtesy Yoon Cohen



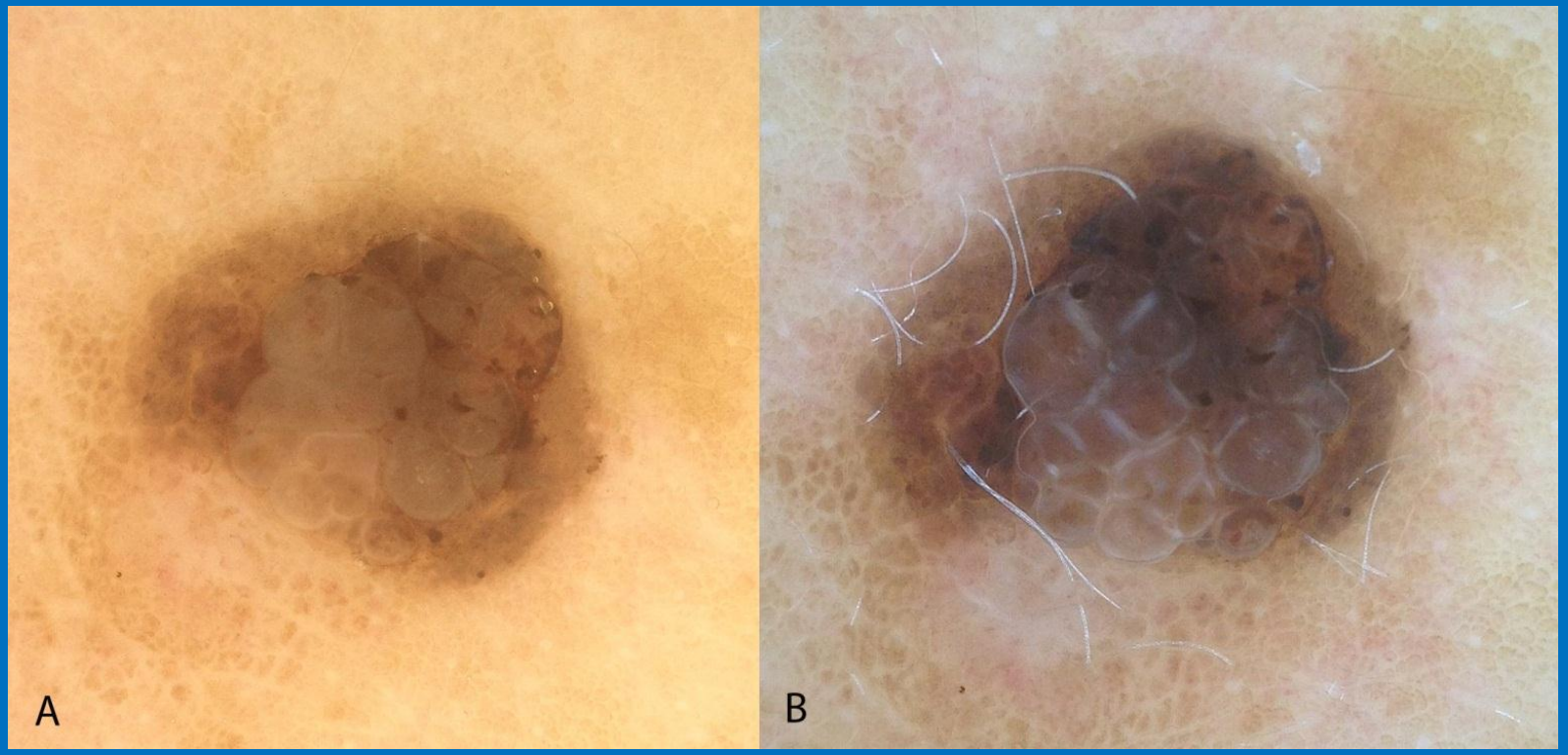
Images courtesy Yoon Cohen (rxderm member)

Note that terminal hairs, consistent with pre-existing congenital naevus, are seen only peripherally and not centrally where polarising-specific white lines cover the invasive melanoma which arose in the naevus.

Glowing in the dark: case report of a clue-poor melanoma unmasked by polarized dermatoscopy.

Dermatol Pract Conc. In press

Yoon K. Cohen DO, David J. Elpern MD, Deon Wolpowitz MD PhD, Cliff Rosendahl MBBS PhD

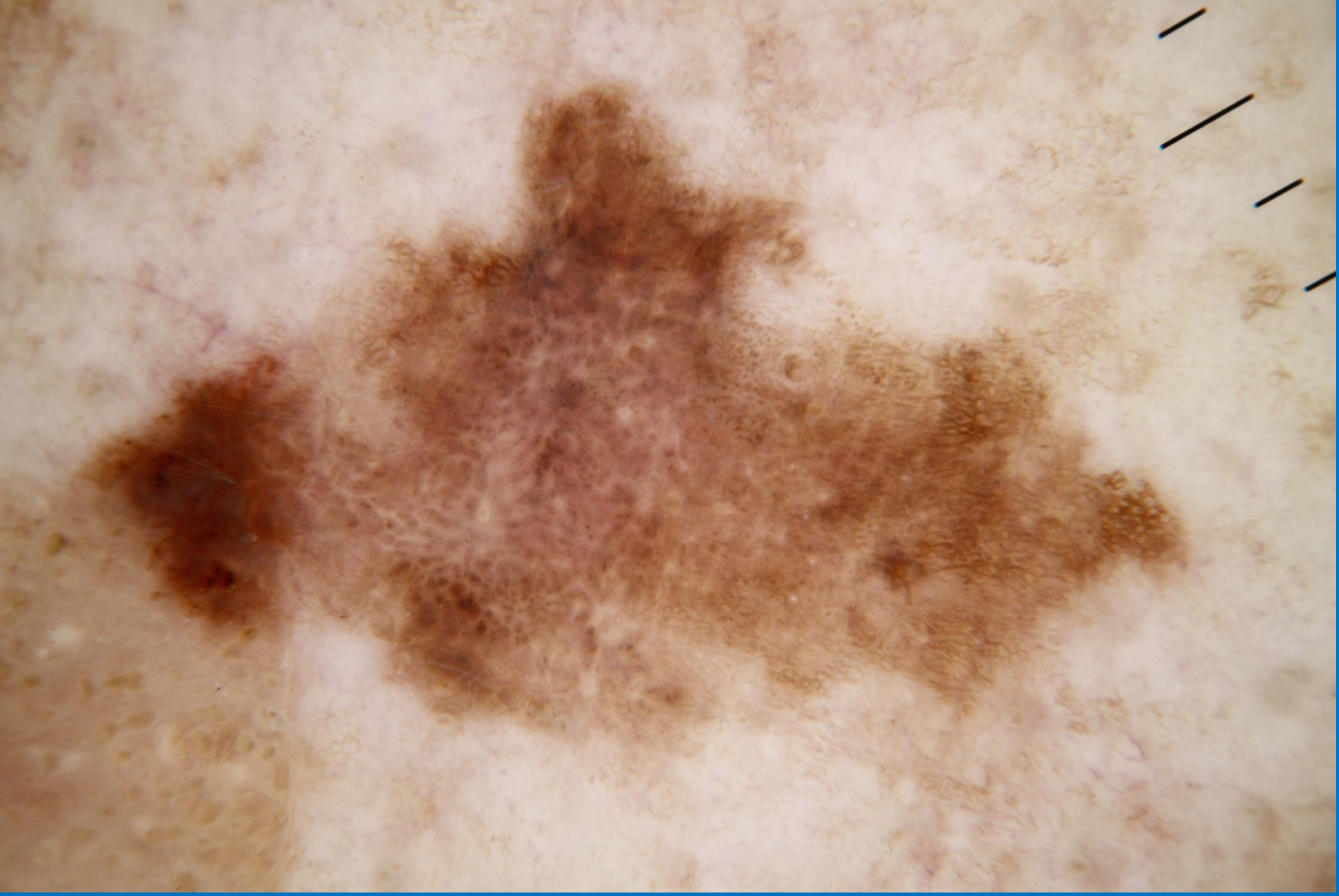


Polarising-specific white lines (chrysalis structures) in a raised lesion are a valuable clue To:-

- Melanoma
- Spitz naevus (symmetrical)
- BCC
- Dermatofibroma (symmetrical)

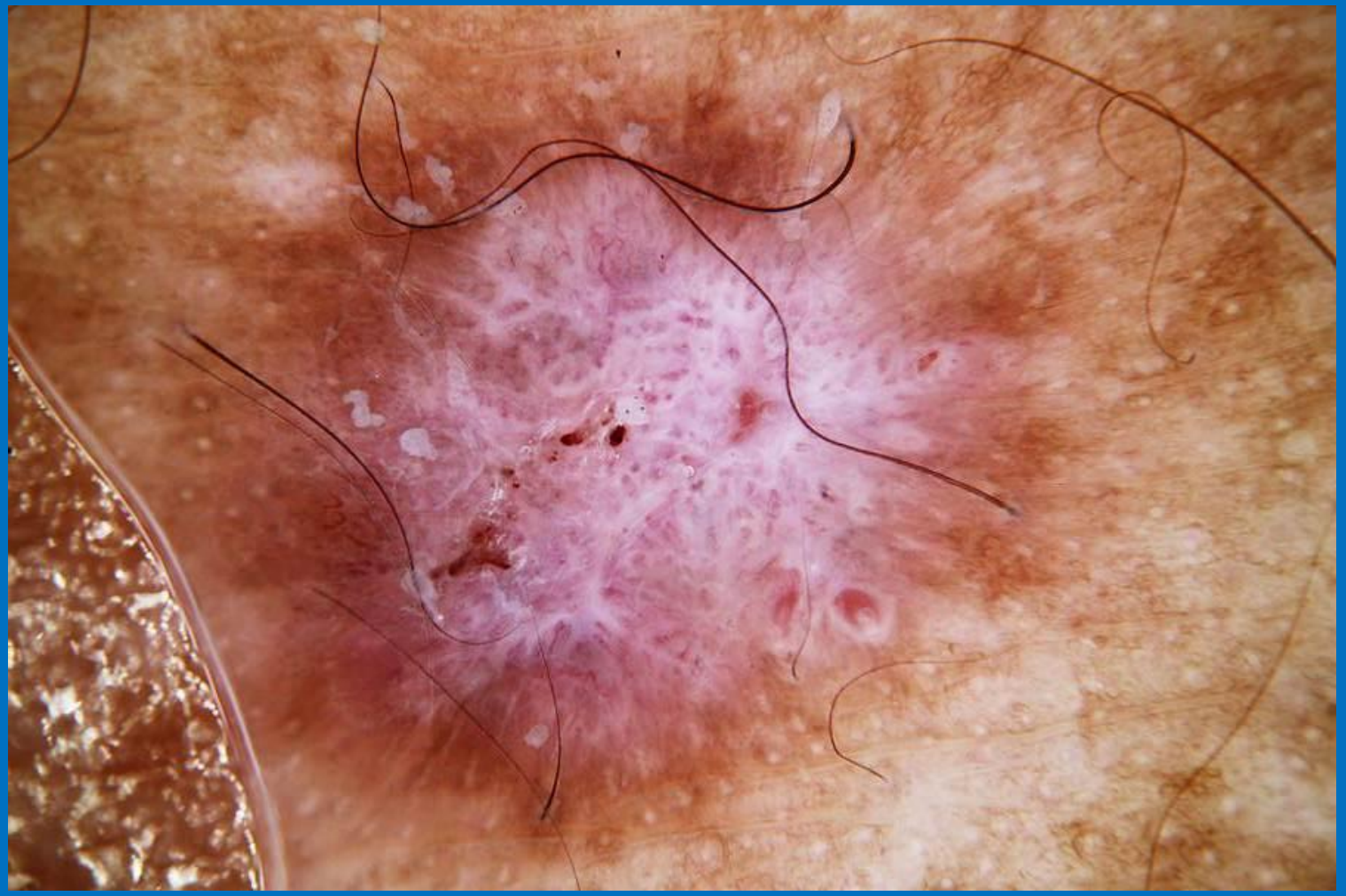
In flat lesions they also occur in lichen-planus-like-keratosis (LPLK), pigmented Bowens and scar tissue so they are not as specific.

In a raised lesion if they are seen in a chaotic lesion which is not a BCC then invasive melanoma is likely. In the experience of the author they are present in most true nodular melanomas

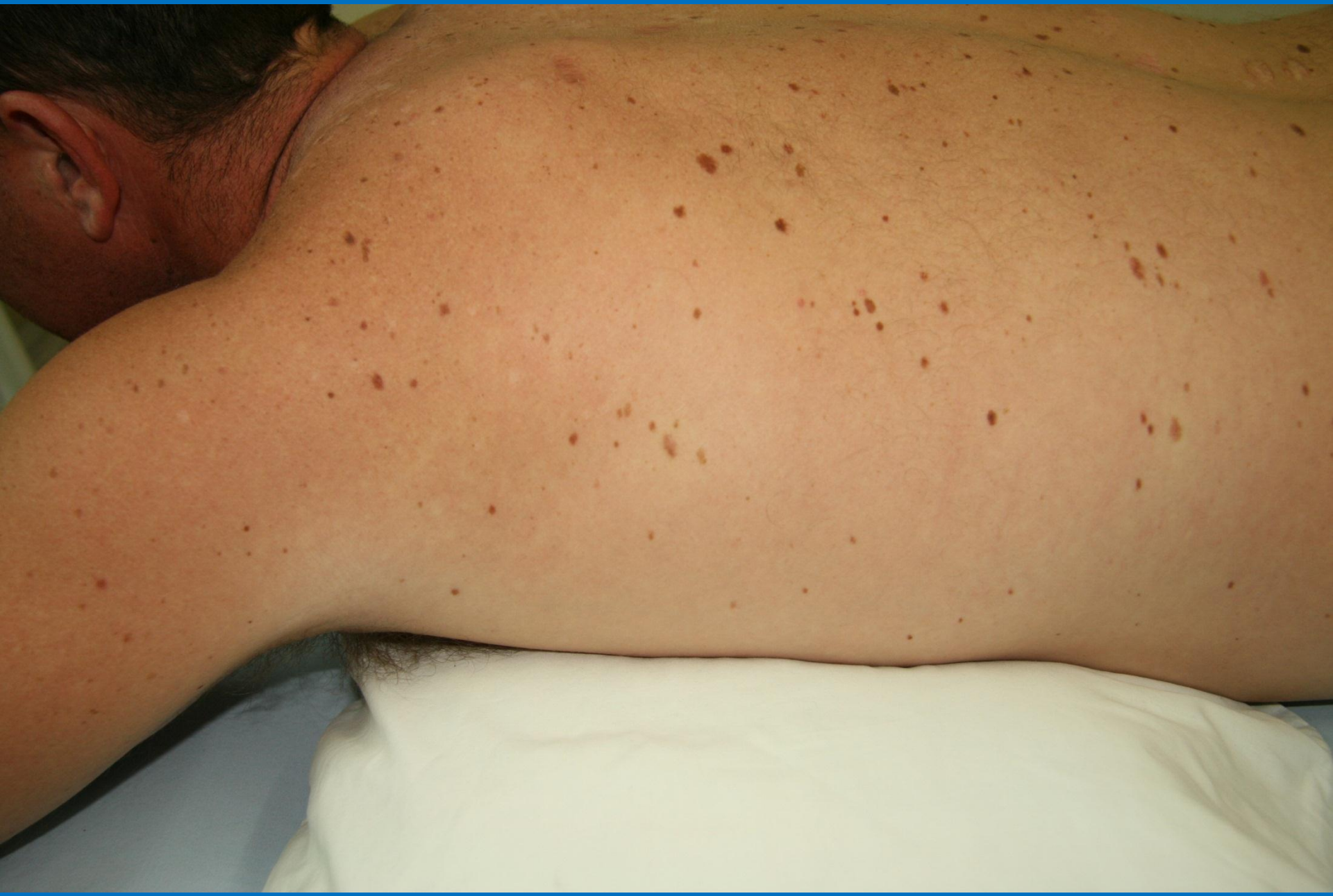


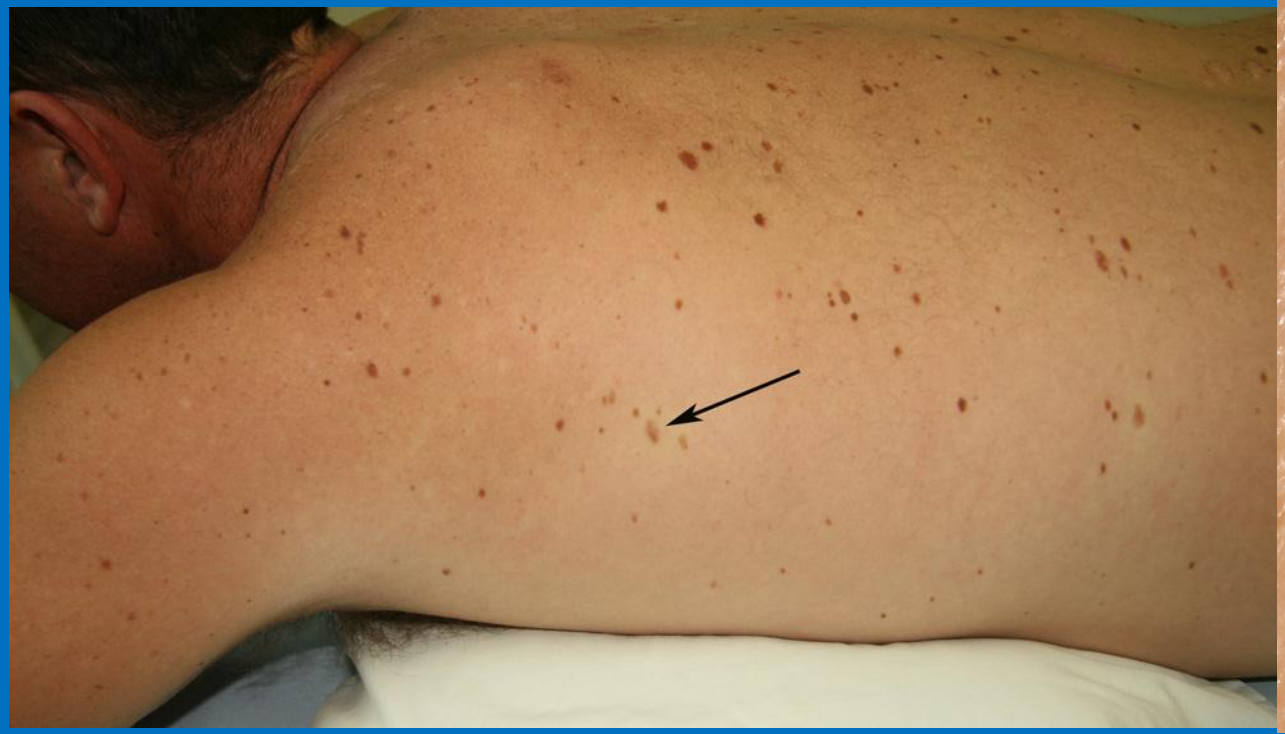
Nests of melanocytes with intervening “normal” skin produce a reticular pattern of skin-coloured (inverse or negative) network. This also is a clue to malignancy in a chaotic lesion.

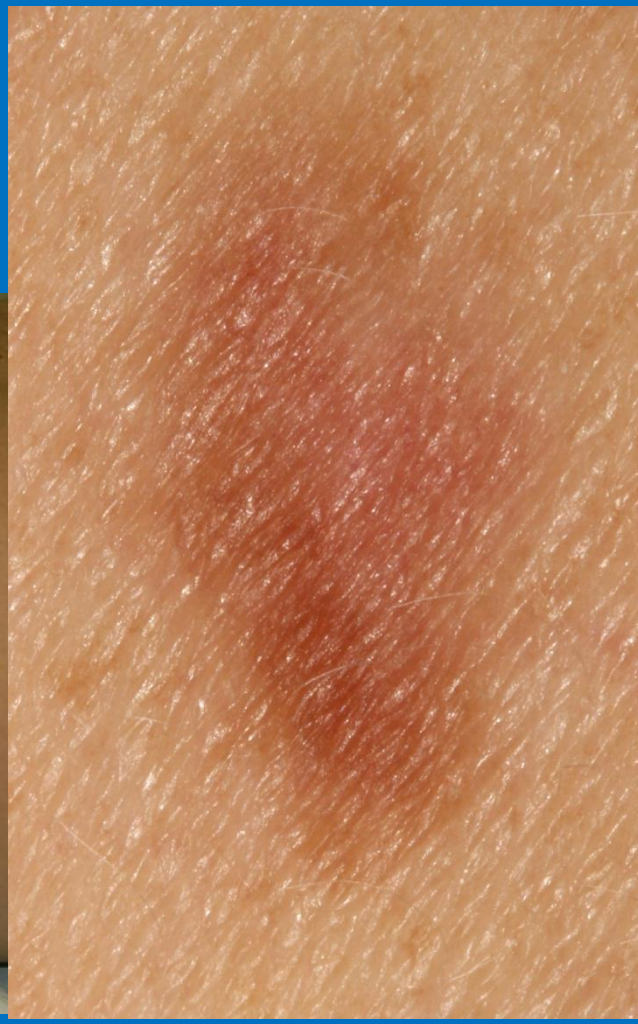
6. White lines



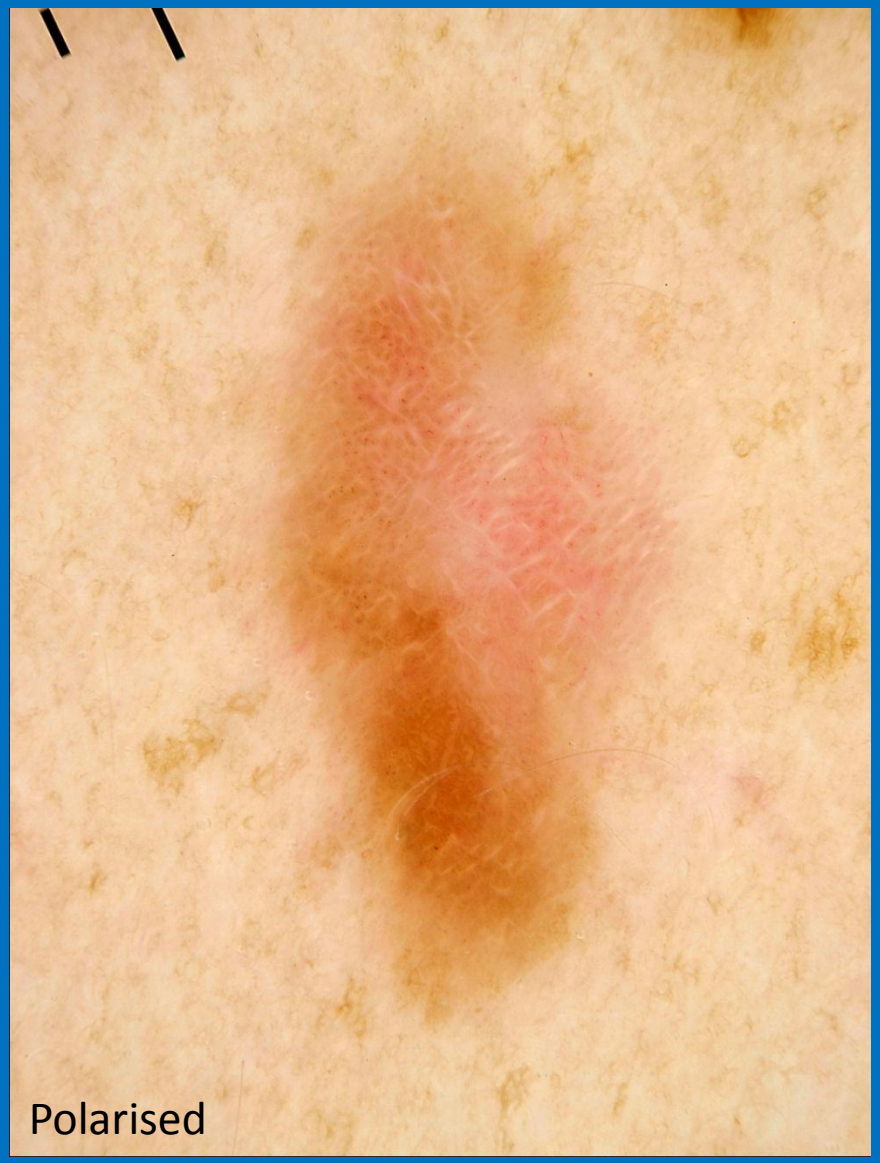
Chaos (borderline) + Clue (white lines) predict suspicion for malignancy. Application of Revised Pattern Analysis predicted melanoma or Spitz naevus with BCC and dermatofibroma in the differential diagnosis. This was a BCC. Only the pathologist can see melanocytes!

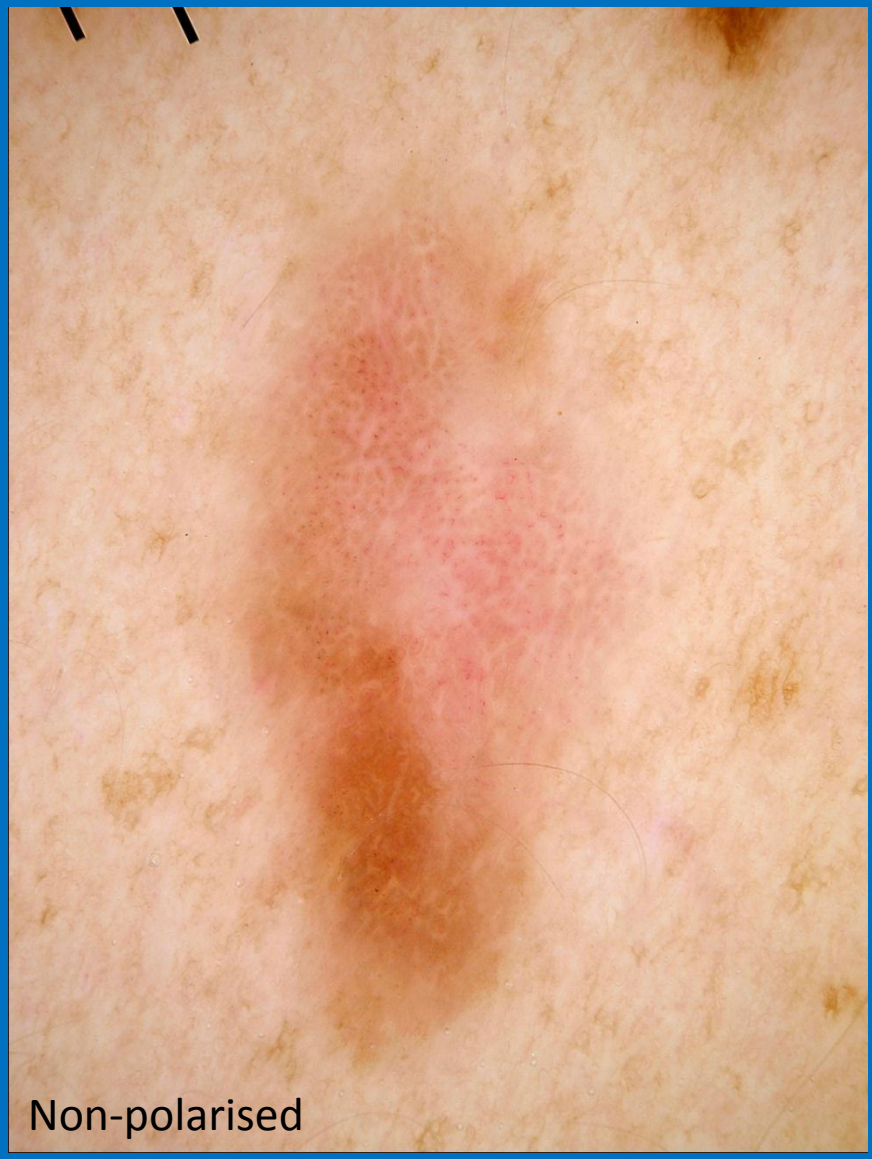






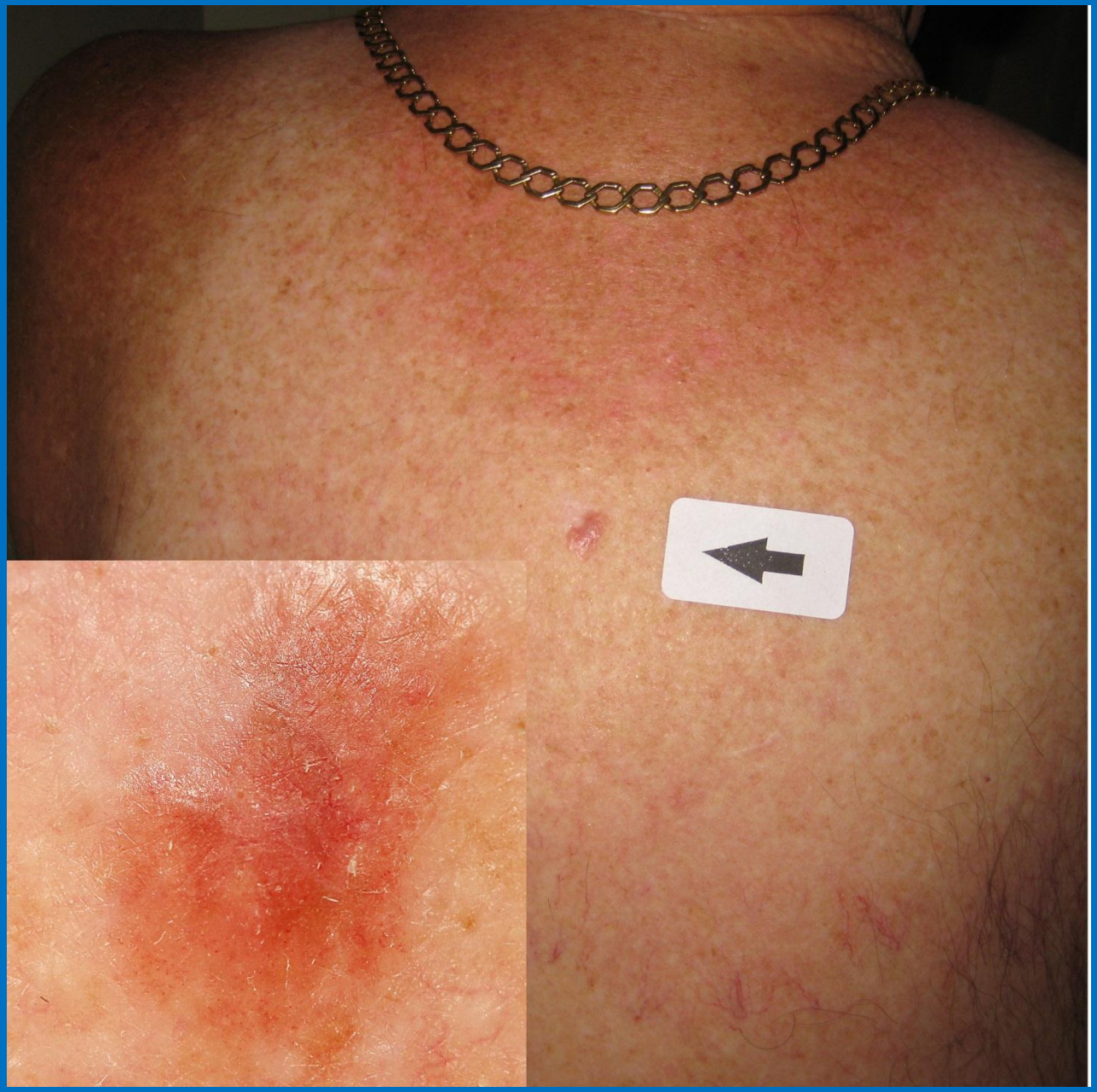
This lesion is indistinguishable from a naevus clinically. It even has the orientation of surrounding naevi. A clue is that on close examination there is an asymmetric combination of brown and pink. **Brown and pink makes you think**.

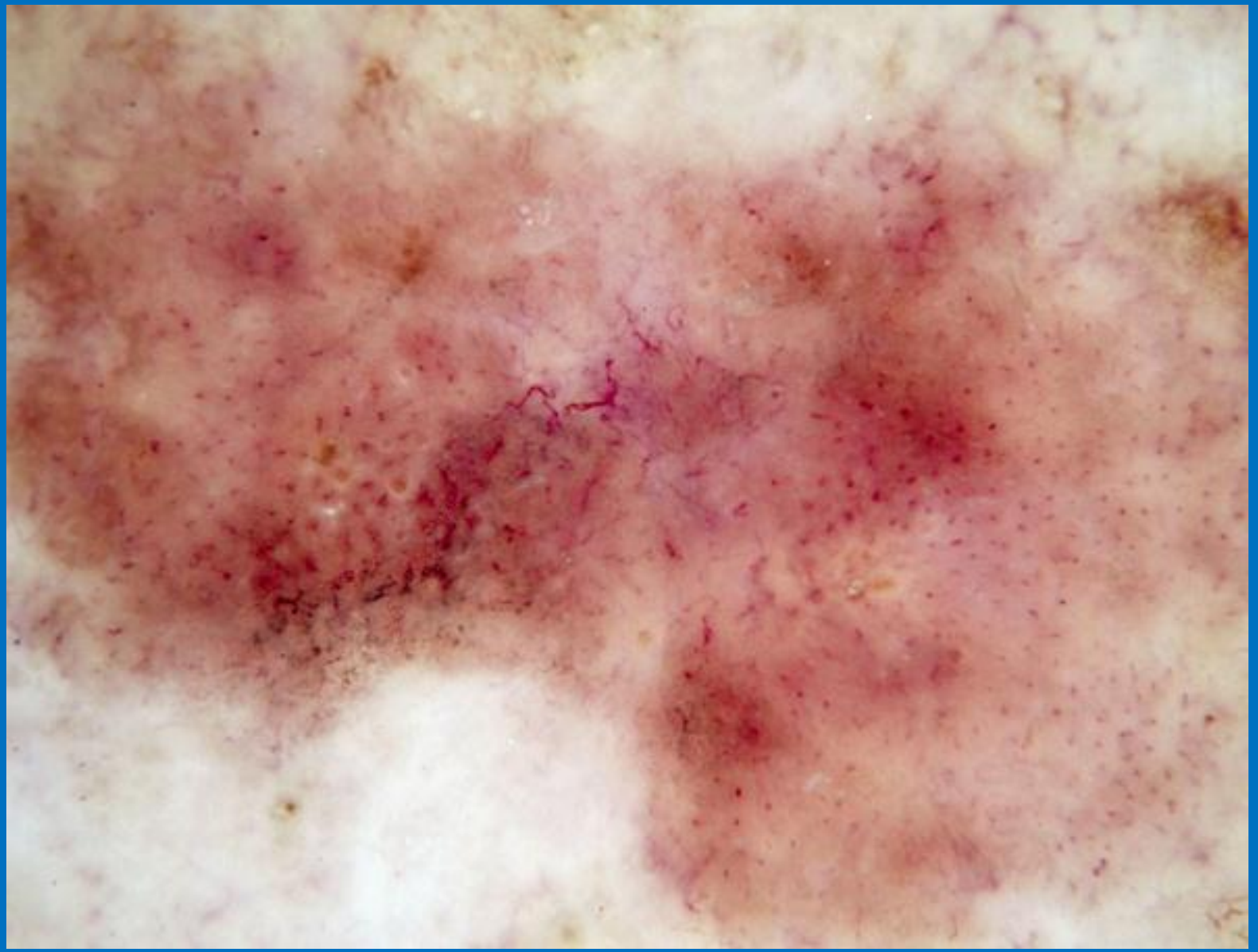




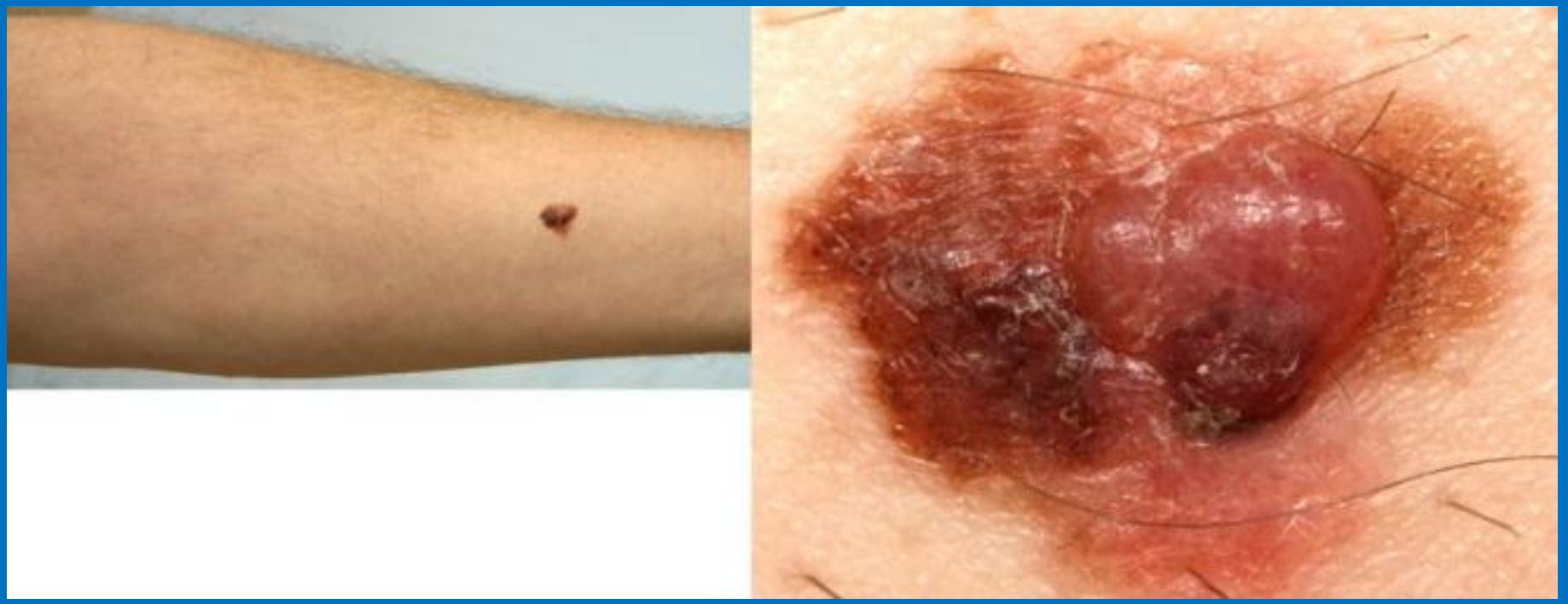
Polarising-specific (perpendicular) white lines are the second clue (after eccentric structureless pink). The presence of more than one clue greatly increases the specificity of Chaos and Clues. This is an in-situ melanoma on a 26 year-old man.

7. Polymorphous vessels

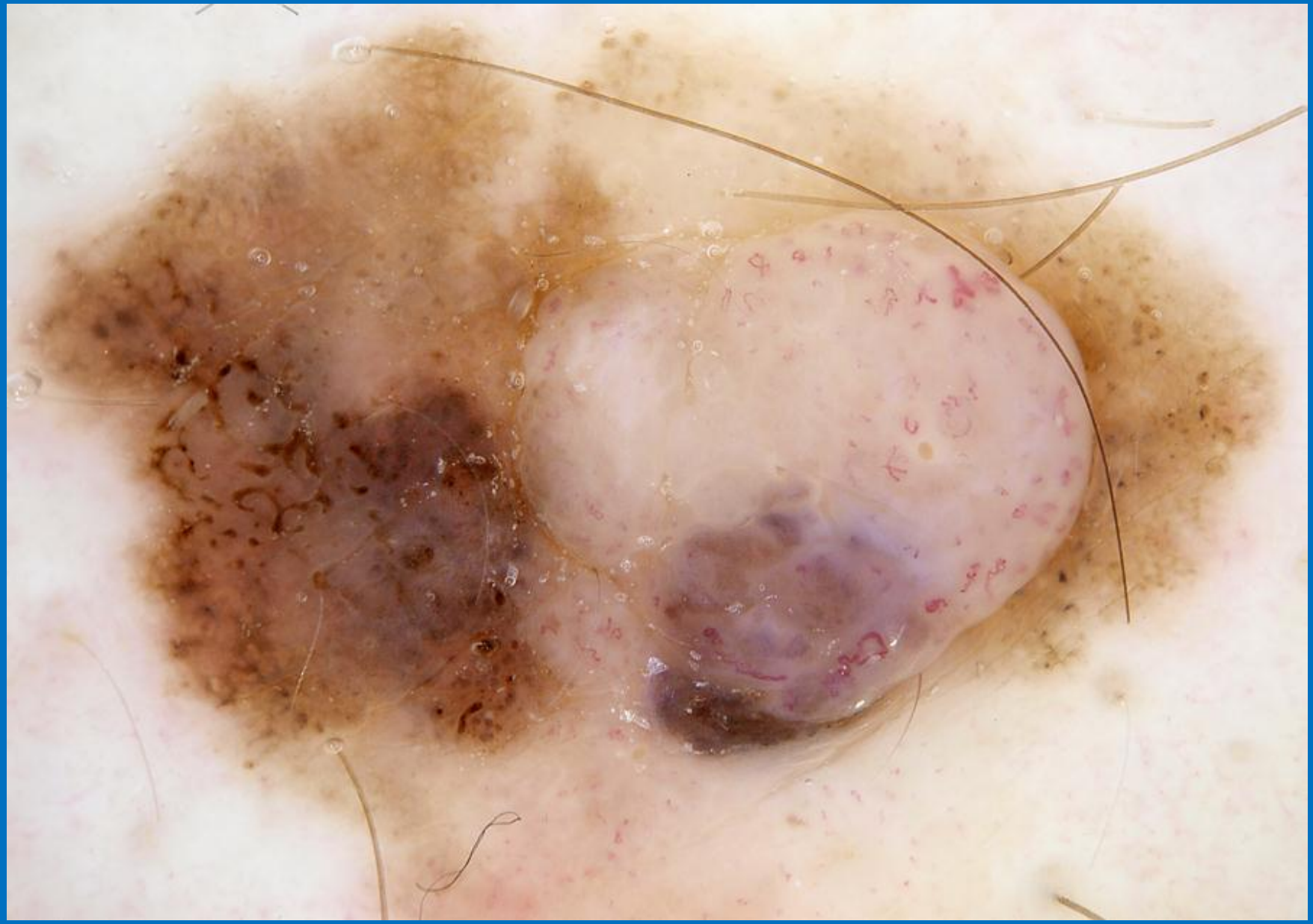




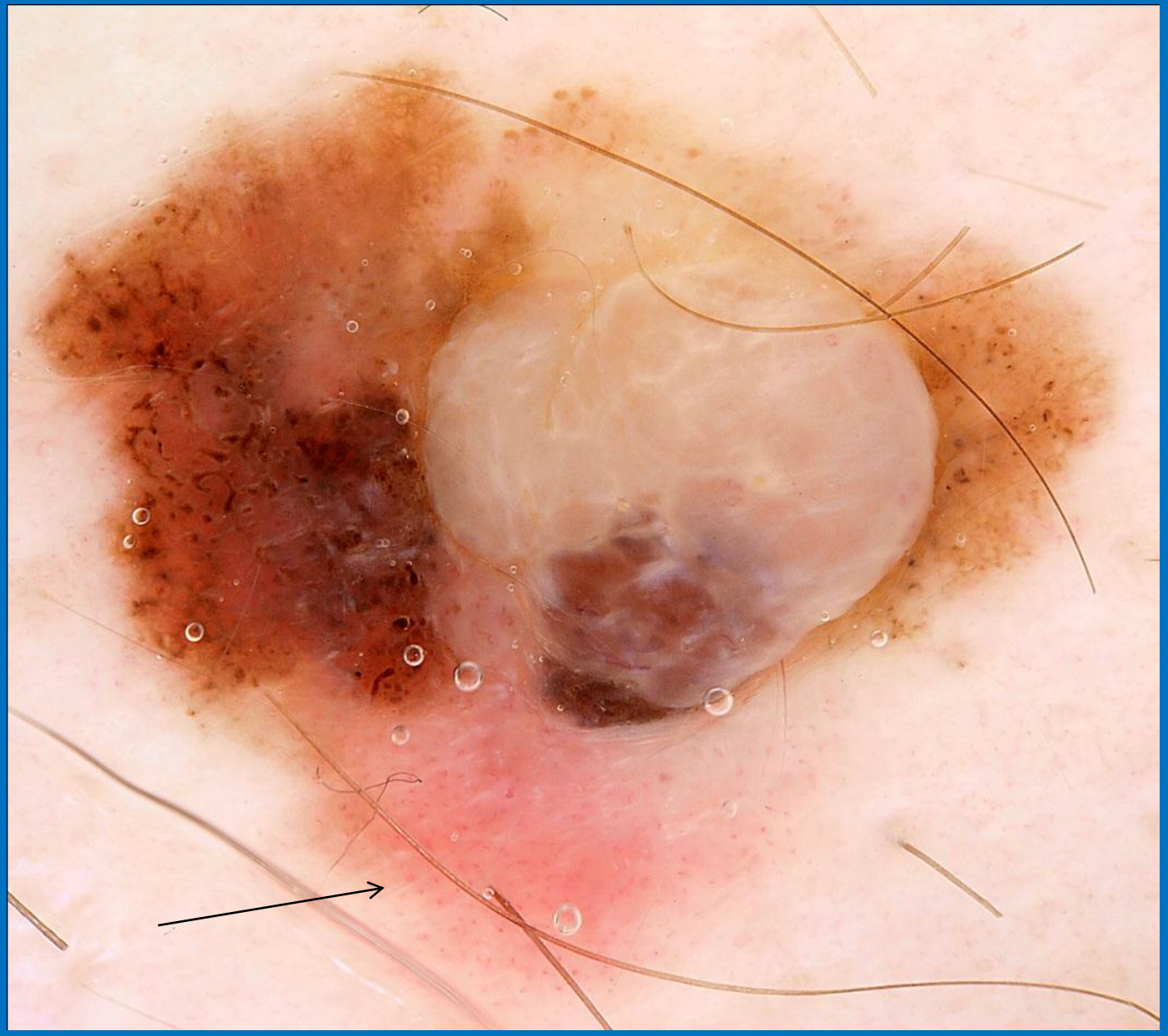
This is a pigmented skin lesion so the assessment for malignant potential should be made with pigmented structures rather than vessels. It has Chaos + Clue (grey dots) so excision biopsy is indicated. The additional clue of polymorphous vessels greatly increases the specificity for malignancy. **Applying Revised Pattern Analysis a polymorphous vessel pattern including a pattern of dots is specific for melanoma**.



A pigmented skin lesion on the forearm of a 40 year-old man. Terminal hairs peripherally are a clue to a pre-existing congenital naevus.

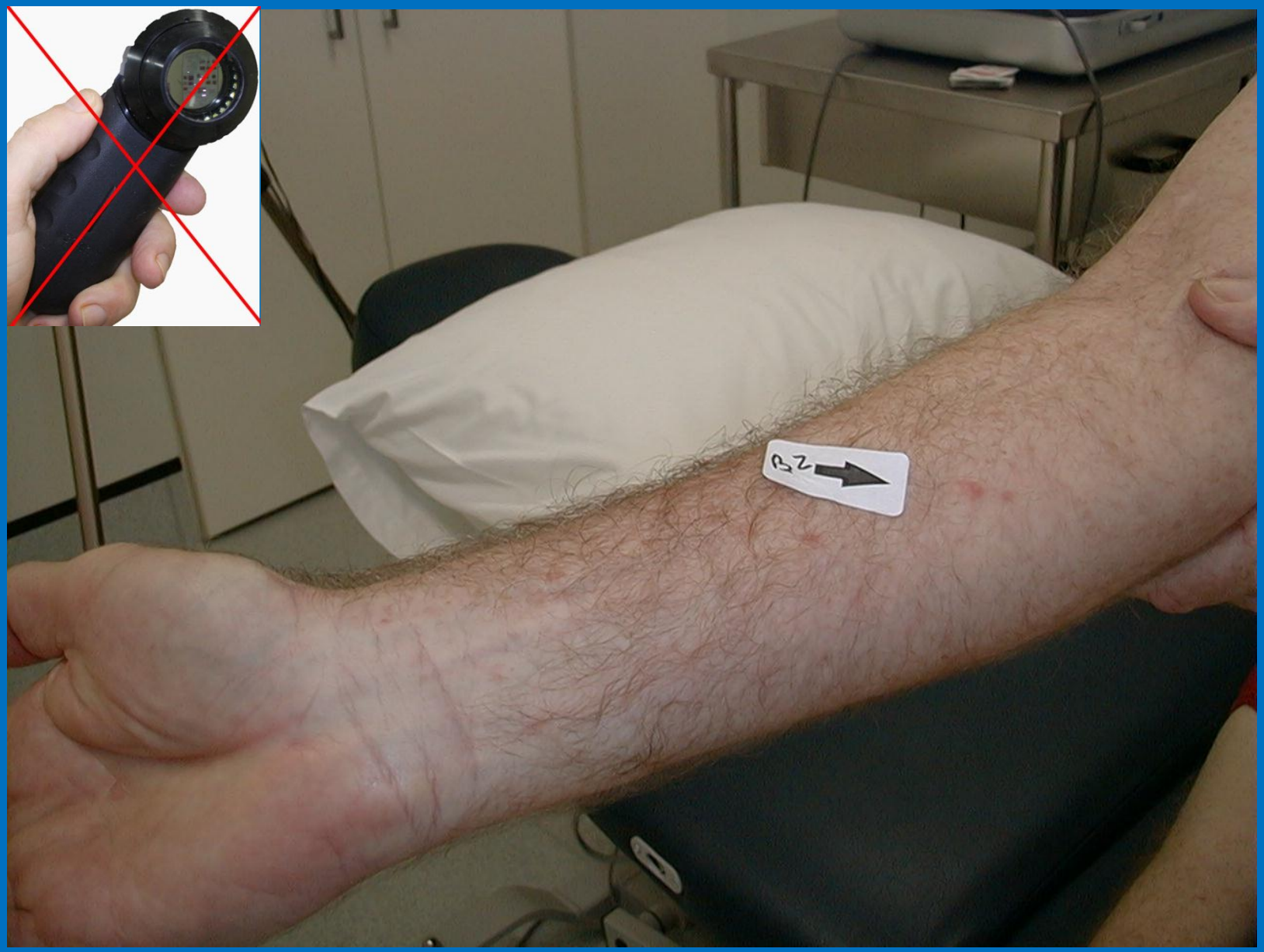


Chaos + Clue (eccentric structureless area) predict malignancy and the additional clue of polymorphous vessels increases the specificity of that prediction. Dot vessels are not seen in the nodular component of a melanoma.

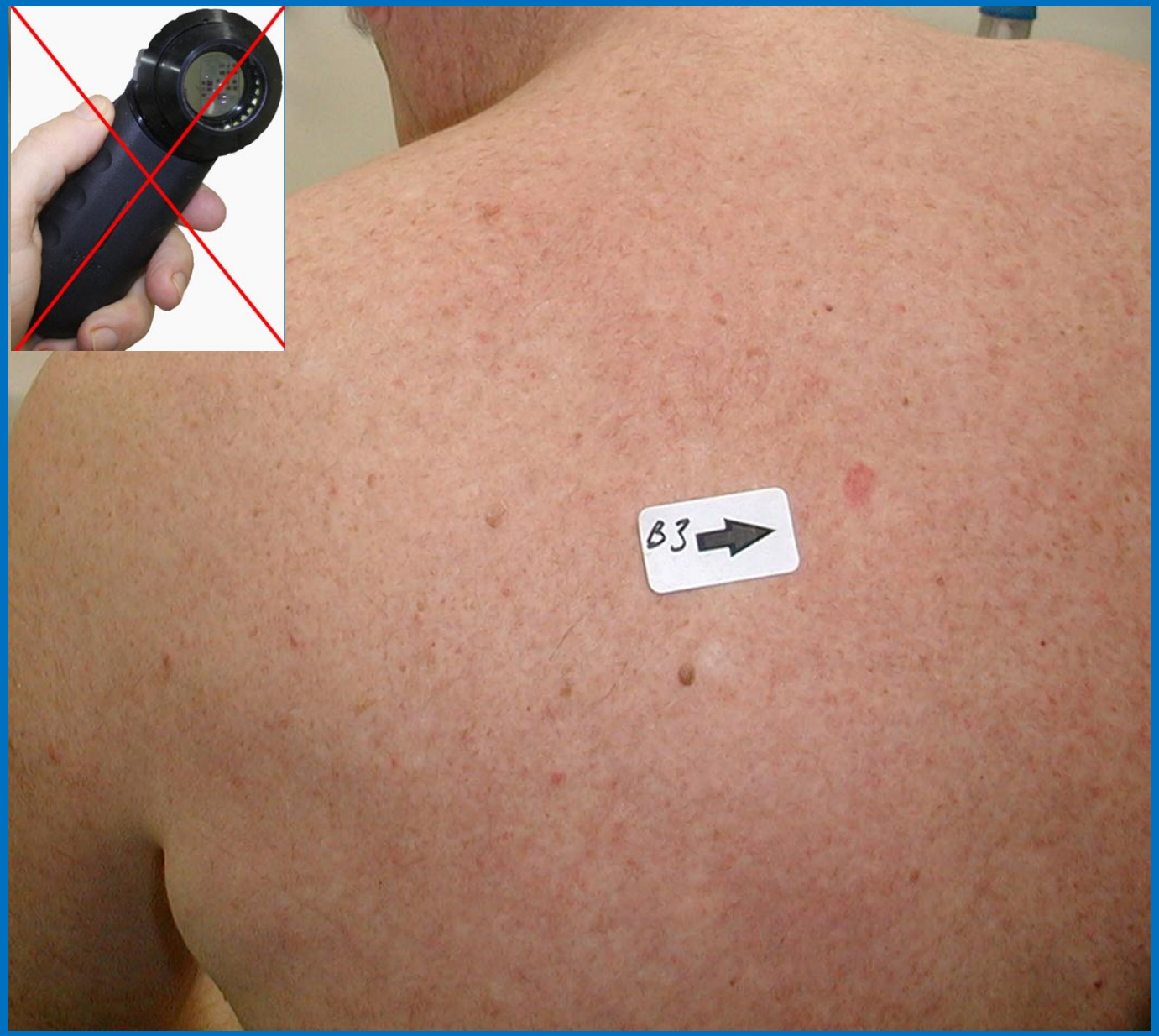


With greater pressure on the dermatoscope foot-plate the vessels in the nodular component disappear but now dot vessels are seen in the macular portion (arrow).

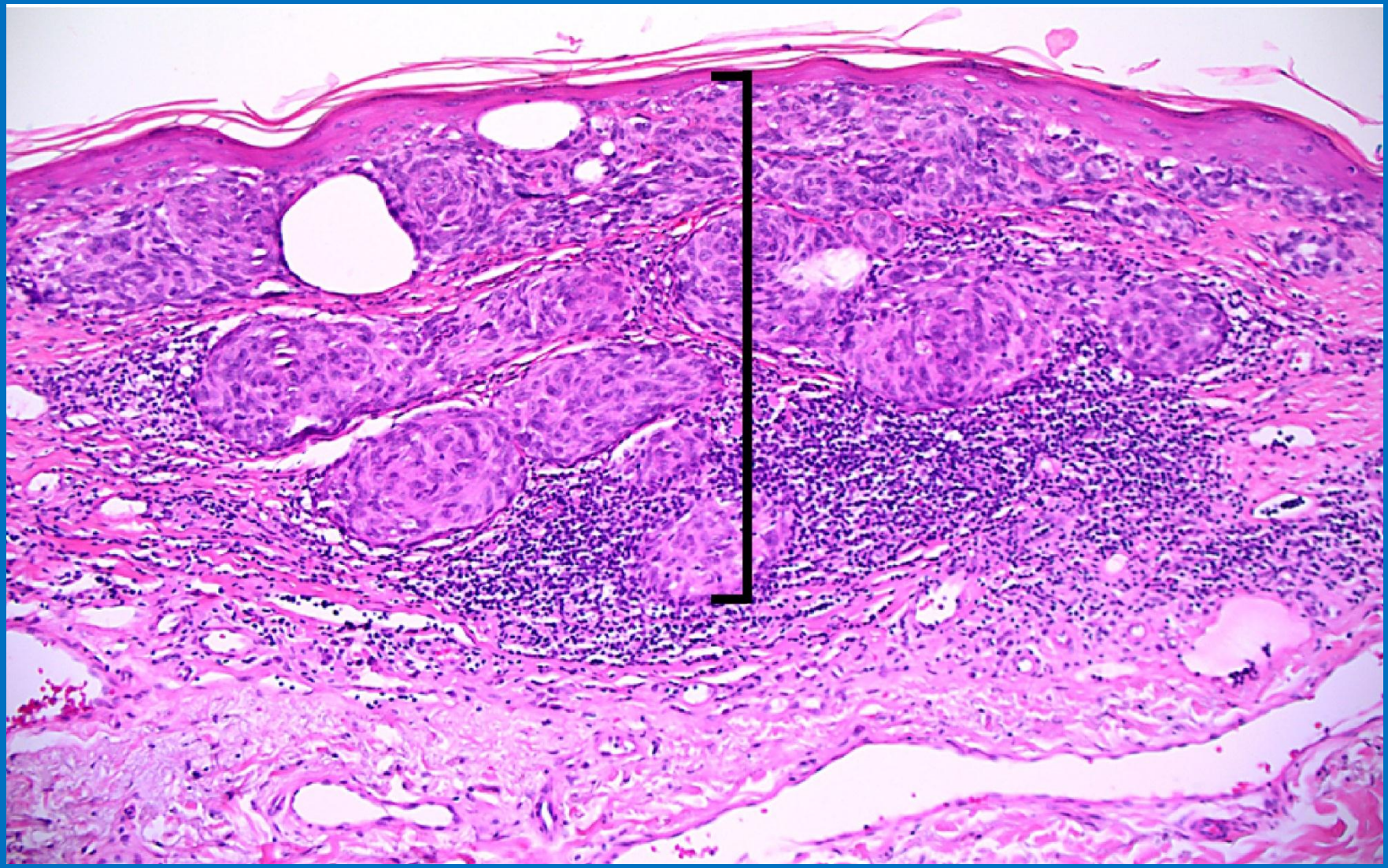
These three images were taken of non-pigmented lesions on the same patient (same day) before the clinician was routinely using dermatoscopy for such lesions. This one was a dermal naevus.



This one was an SCC in-situ.



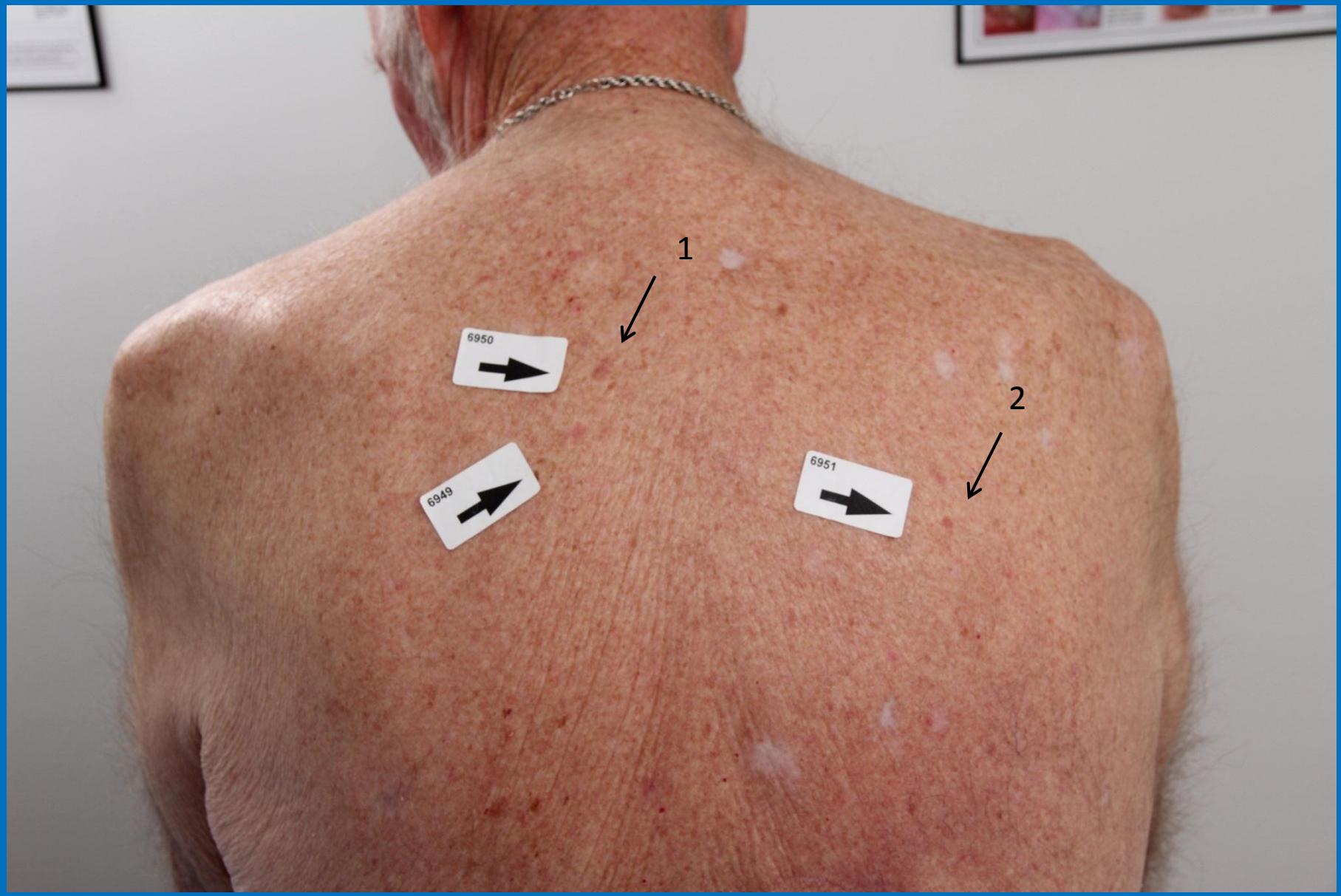
This was an invasive amelanotic melanoma with Breslow thickness 0.8mm



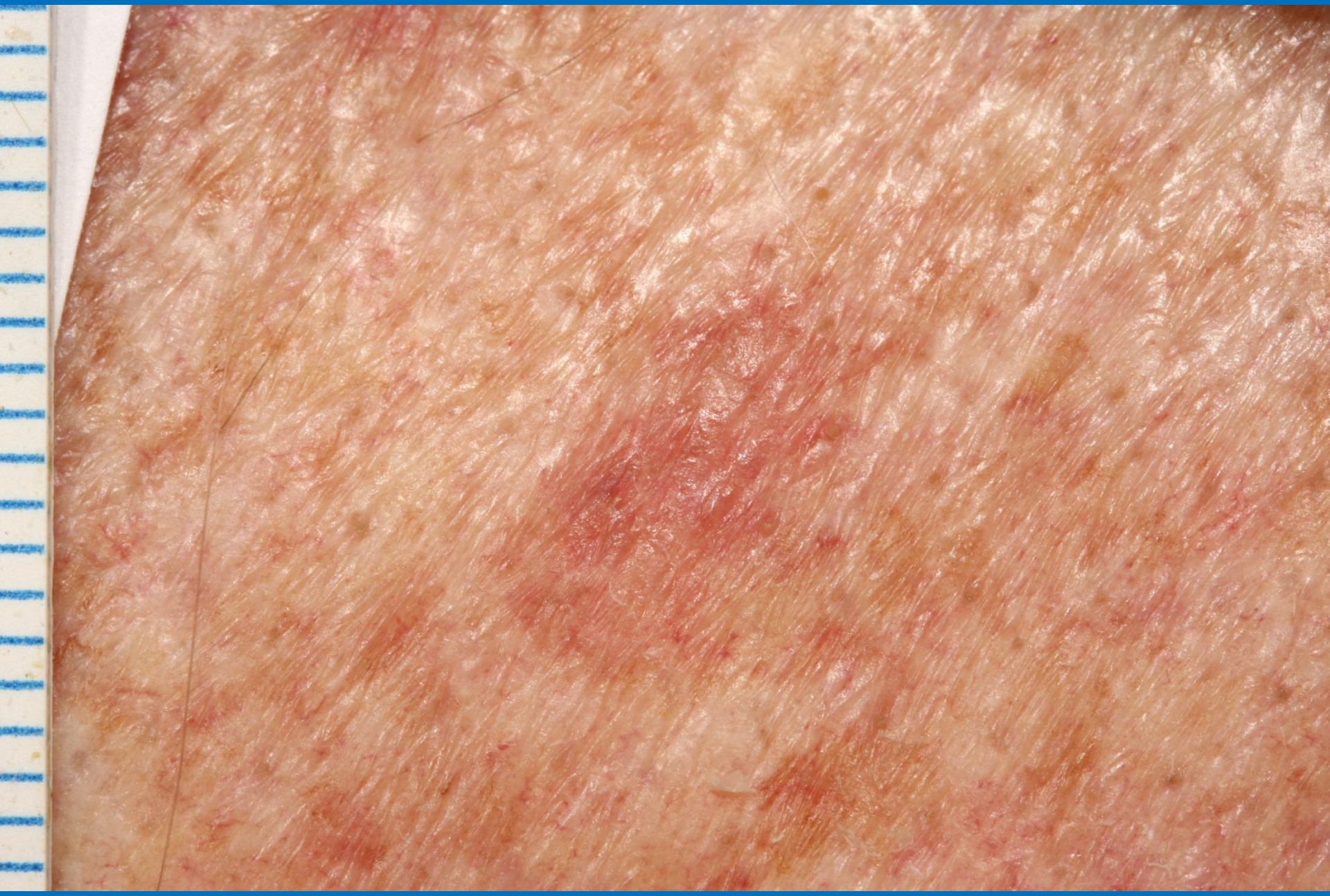
Fortunately the curettage/cautery (of presumed SCC in-situ) was preceded by a shave biopsy approximately 1mm thick so Breslow measurement was possible. If a lesion is flat then if it is a melanoma it should be less than 1mm thick.

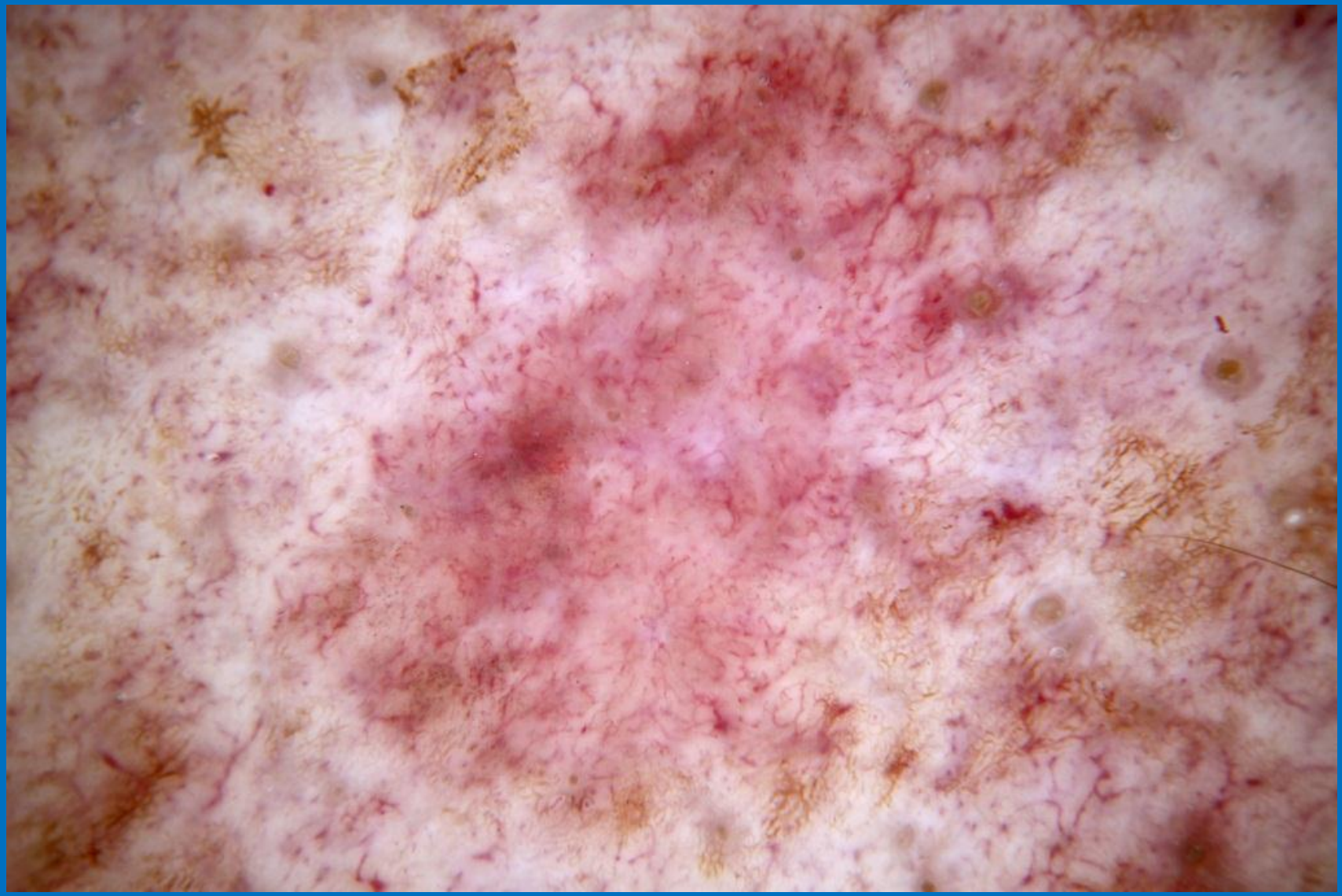
Without using dermatoscopy the clinician was effectively flying blind.

[4]



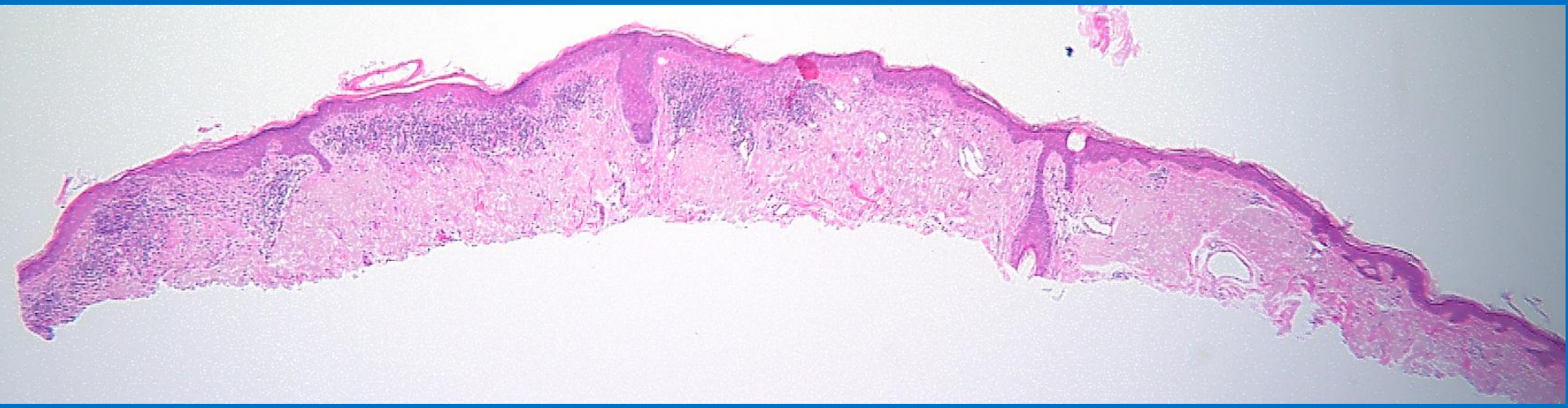
72 year old man

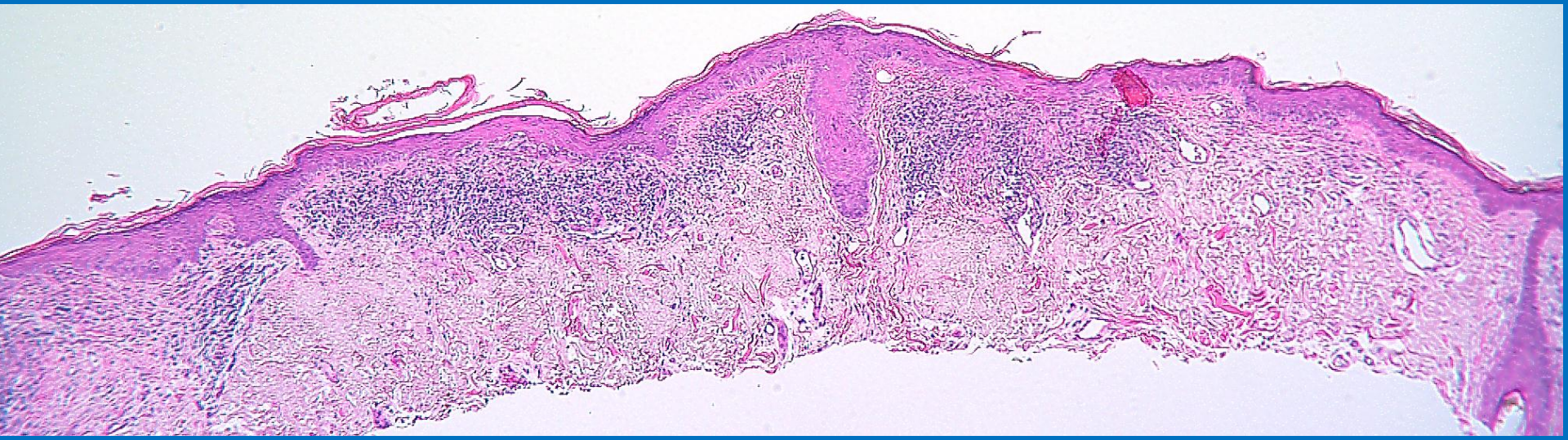


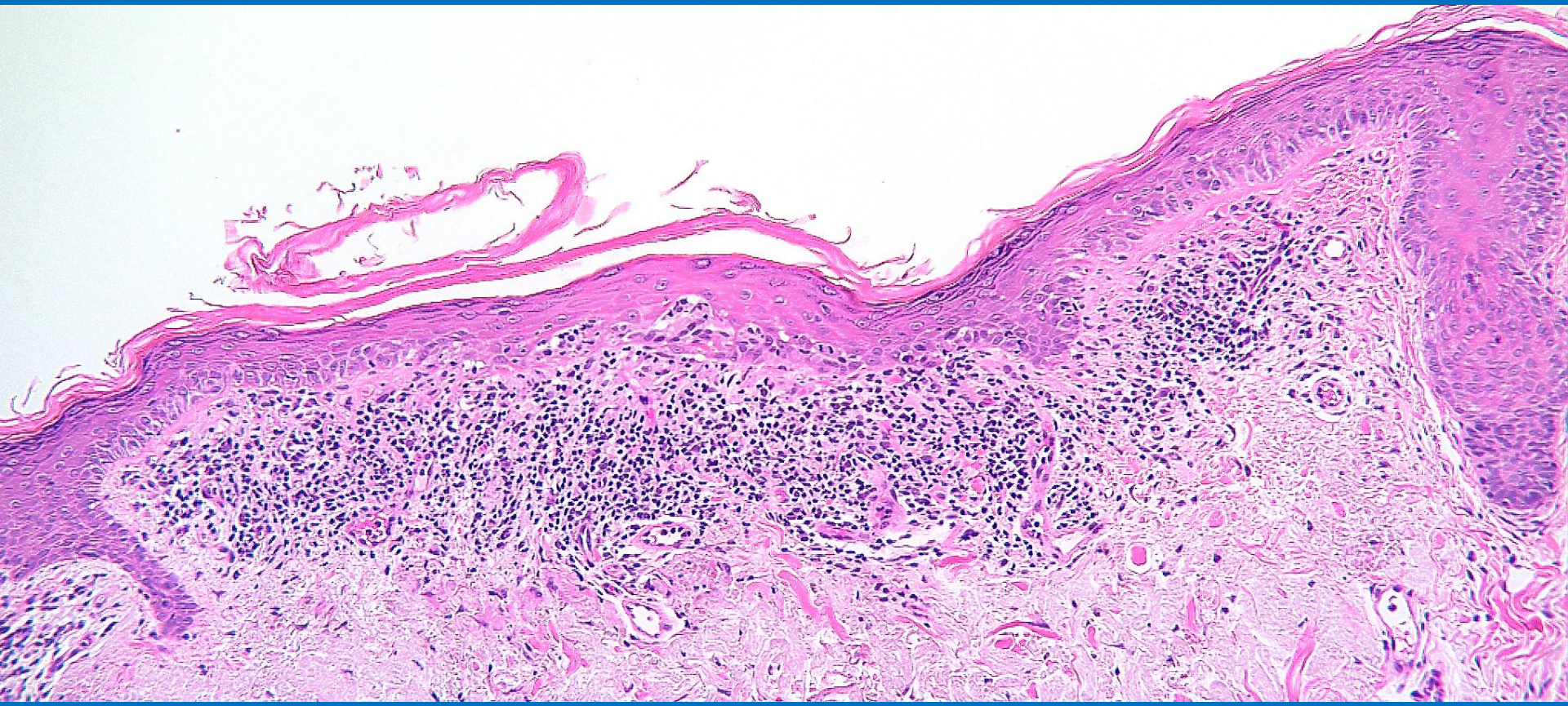


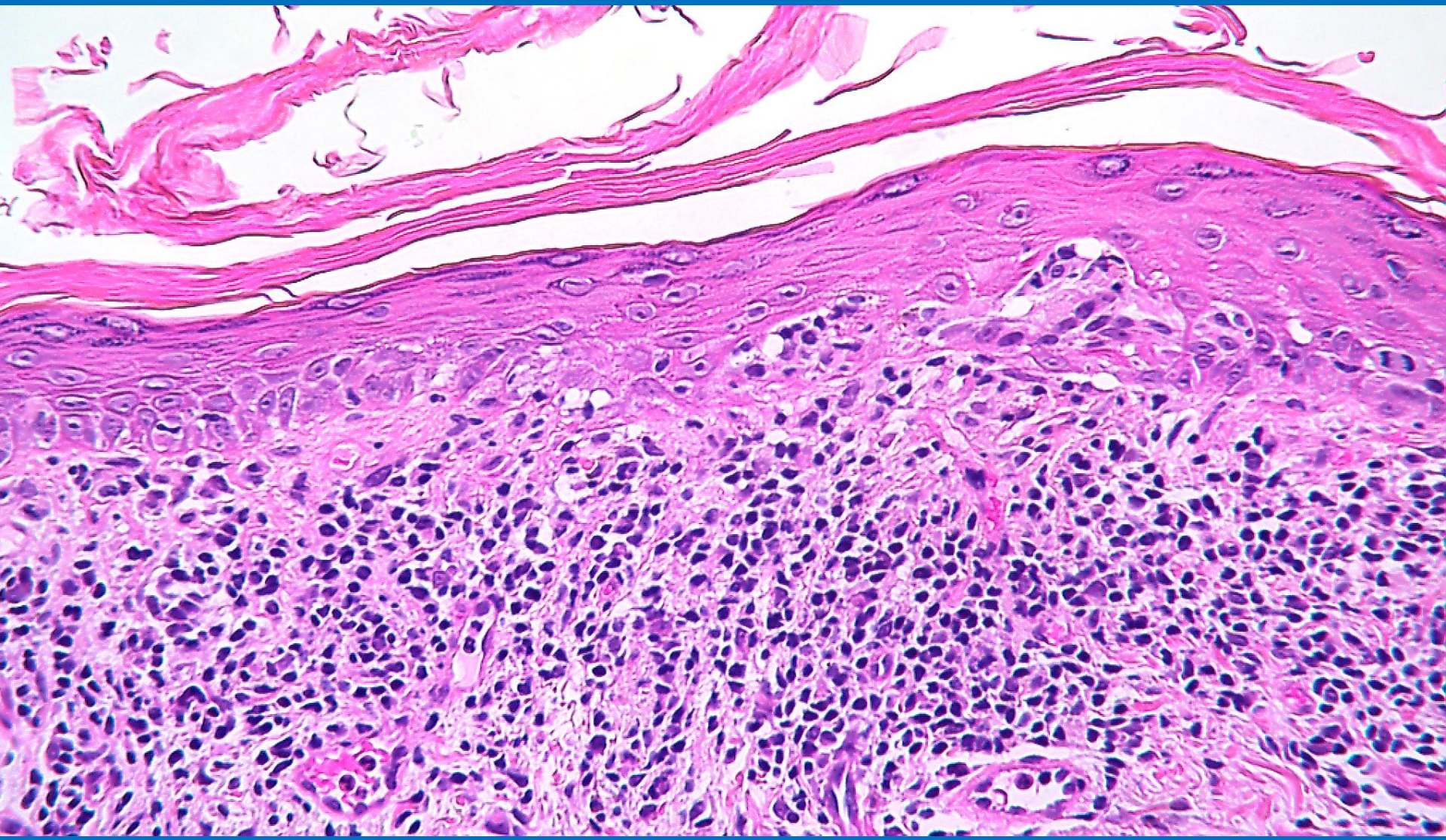
Note polymorphous vessel including dots. In-situ melanoma.

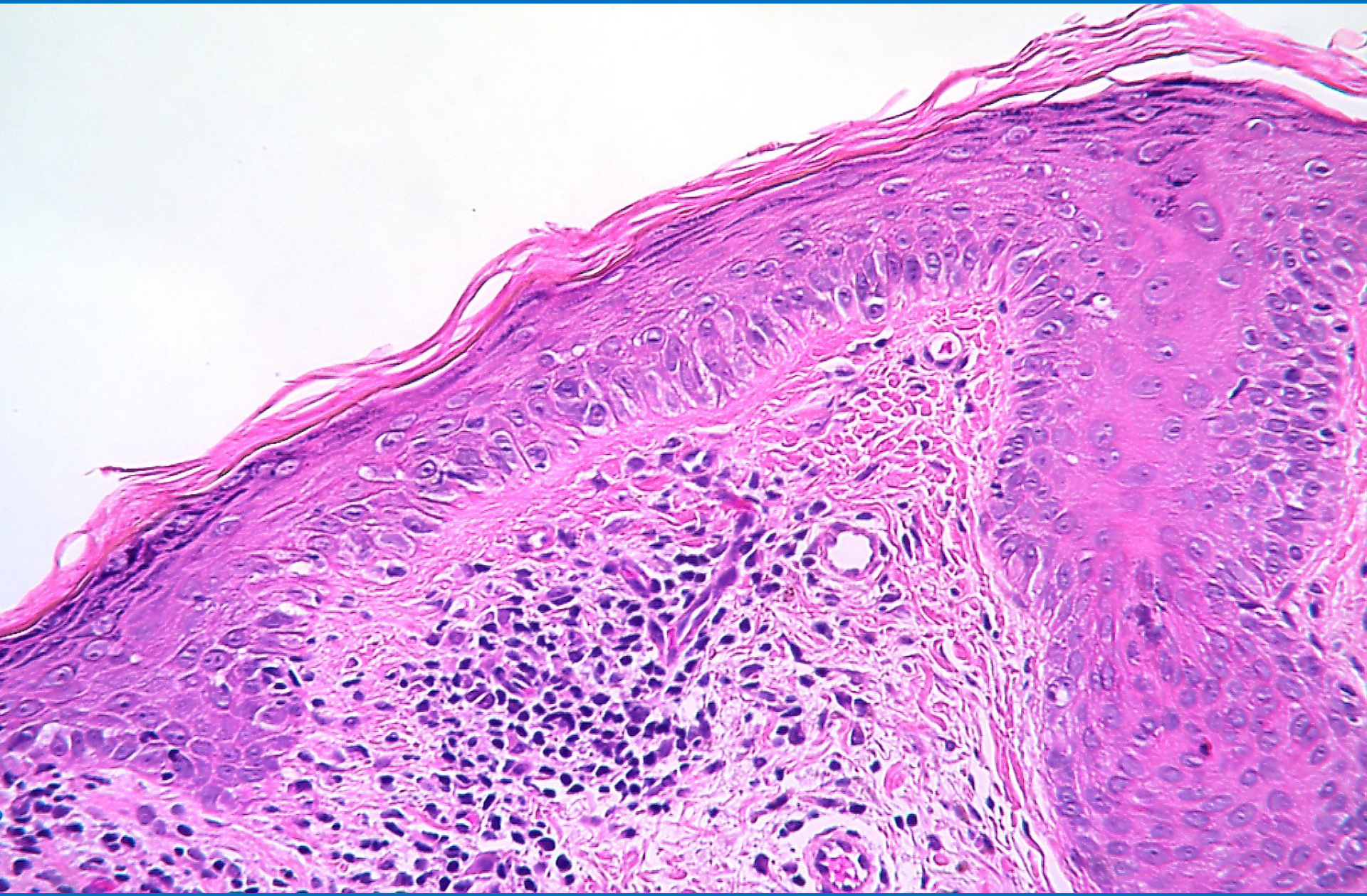
[4]

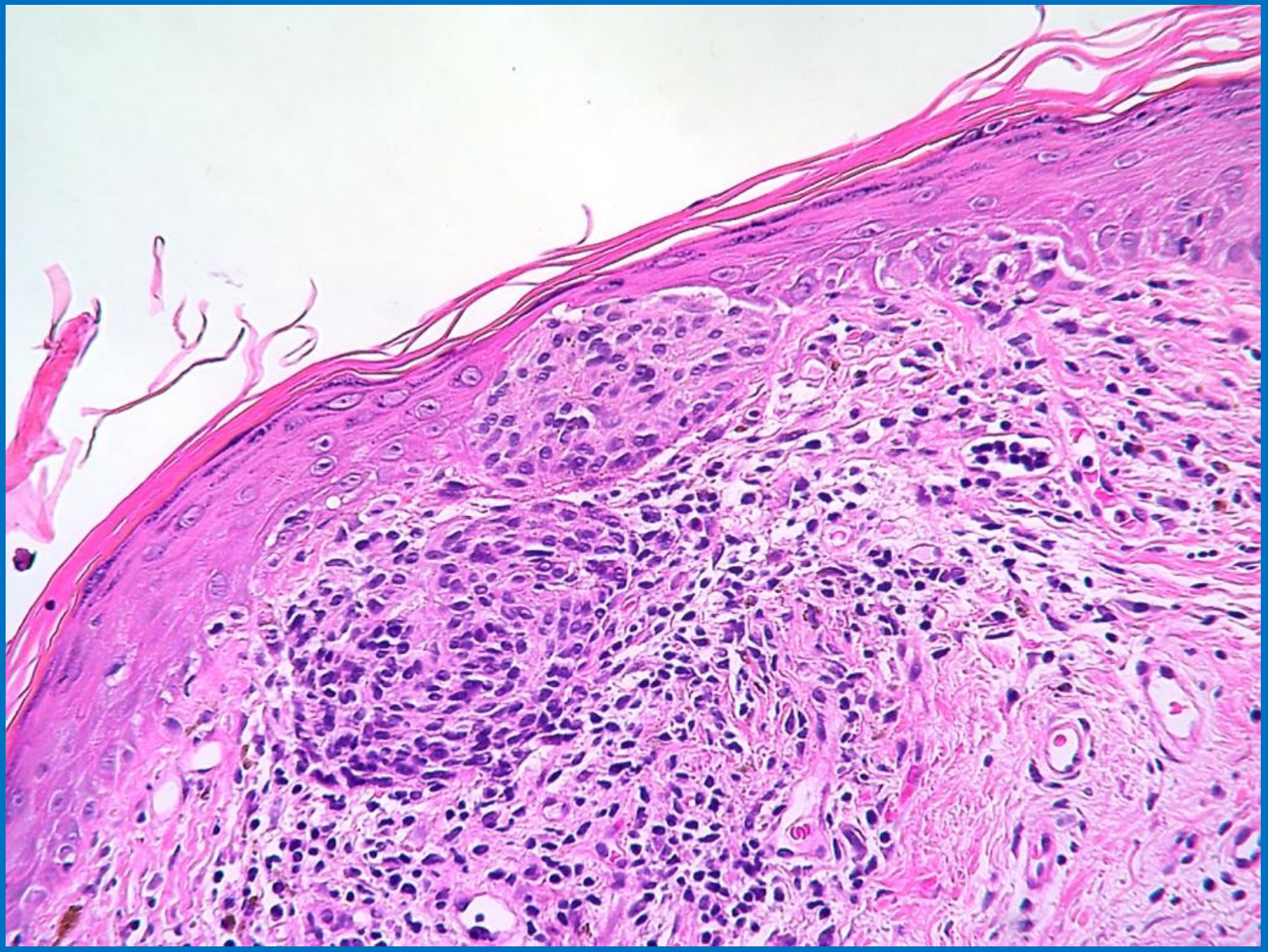


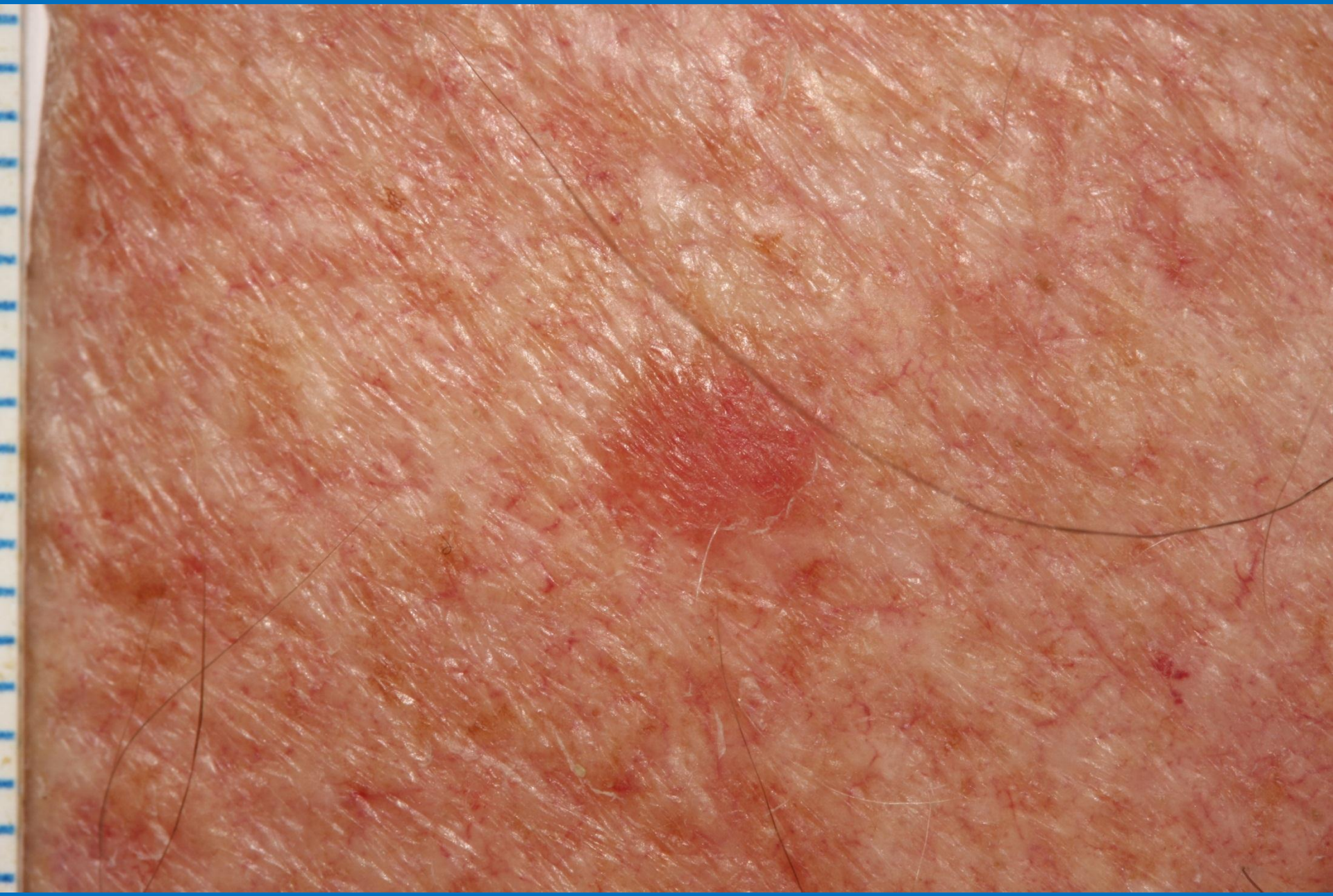


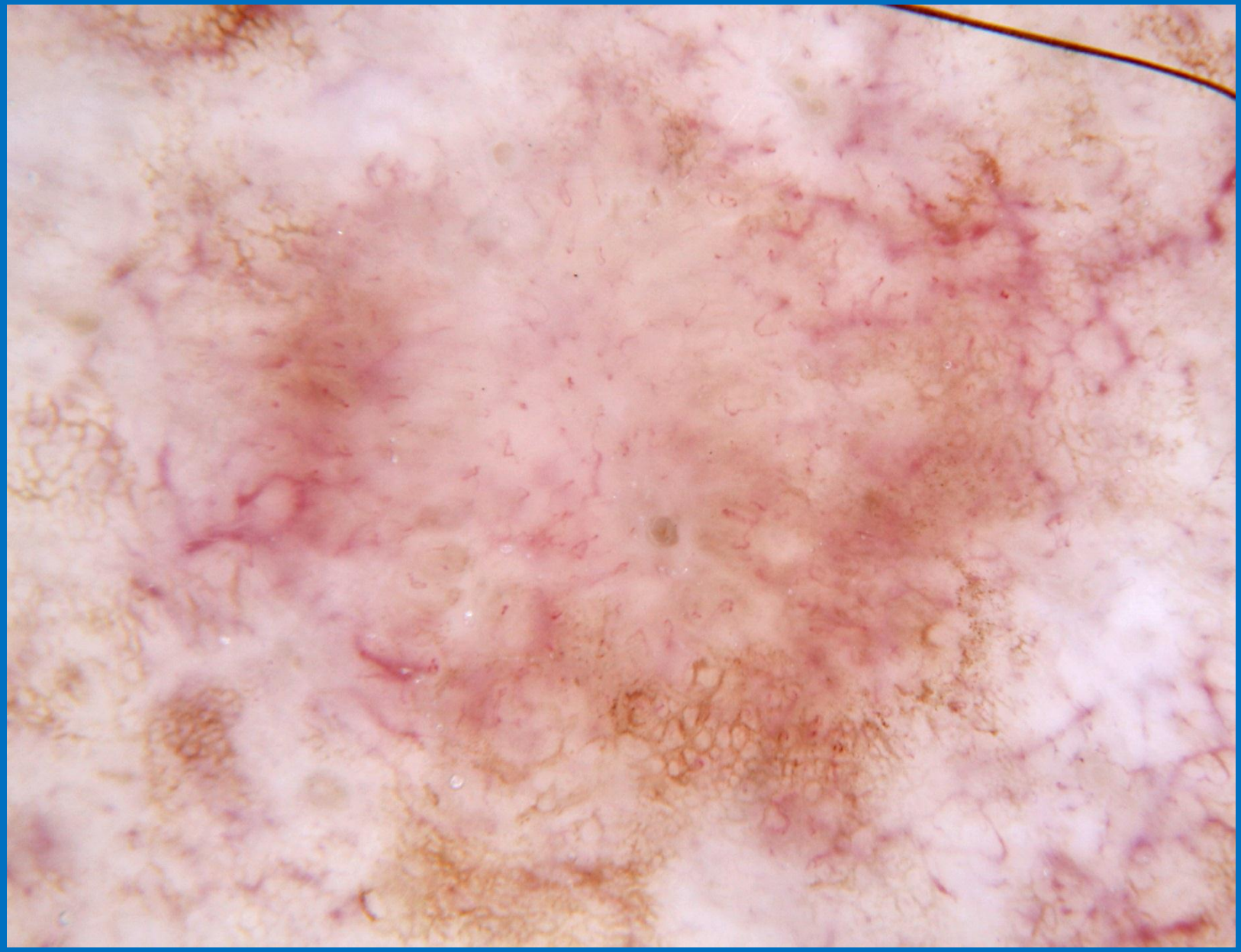












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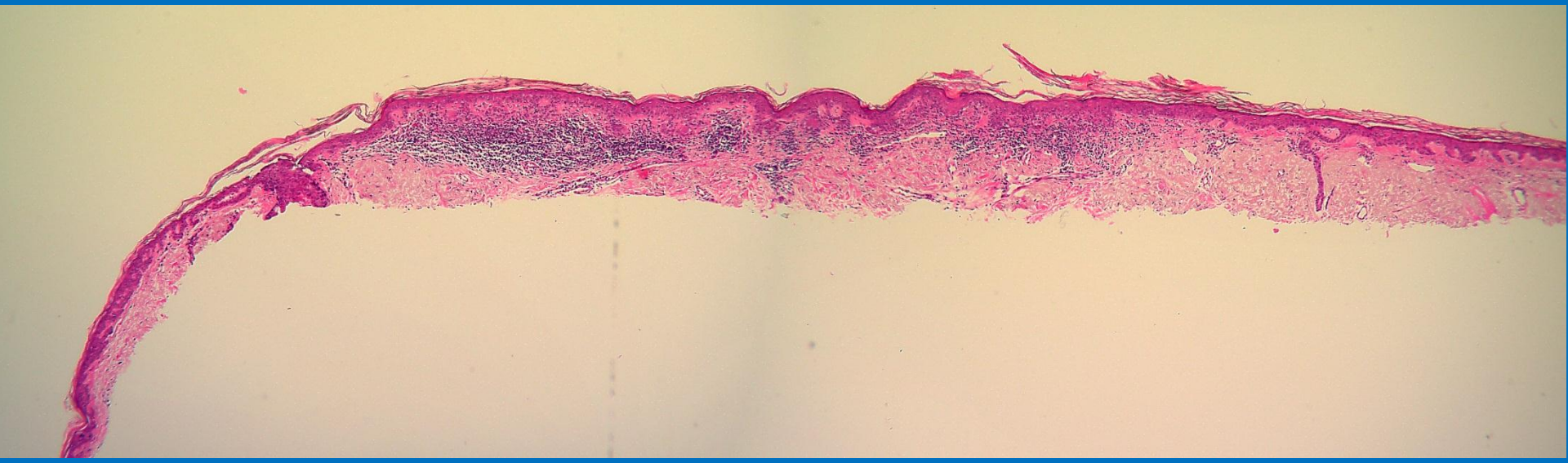
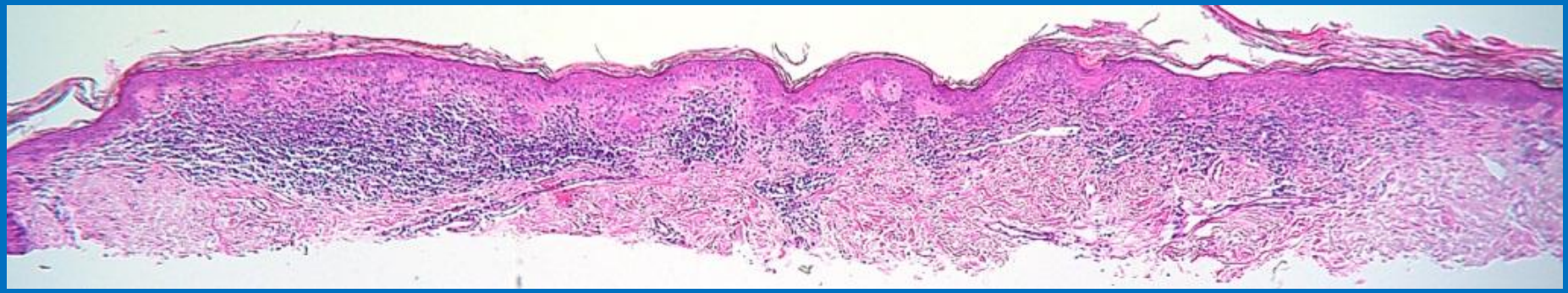
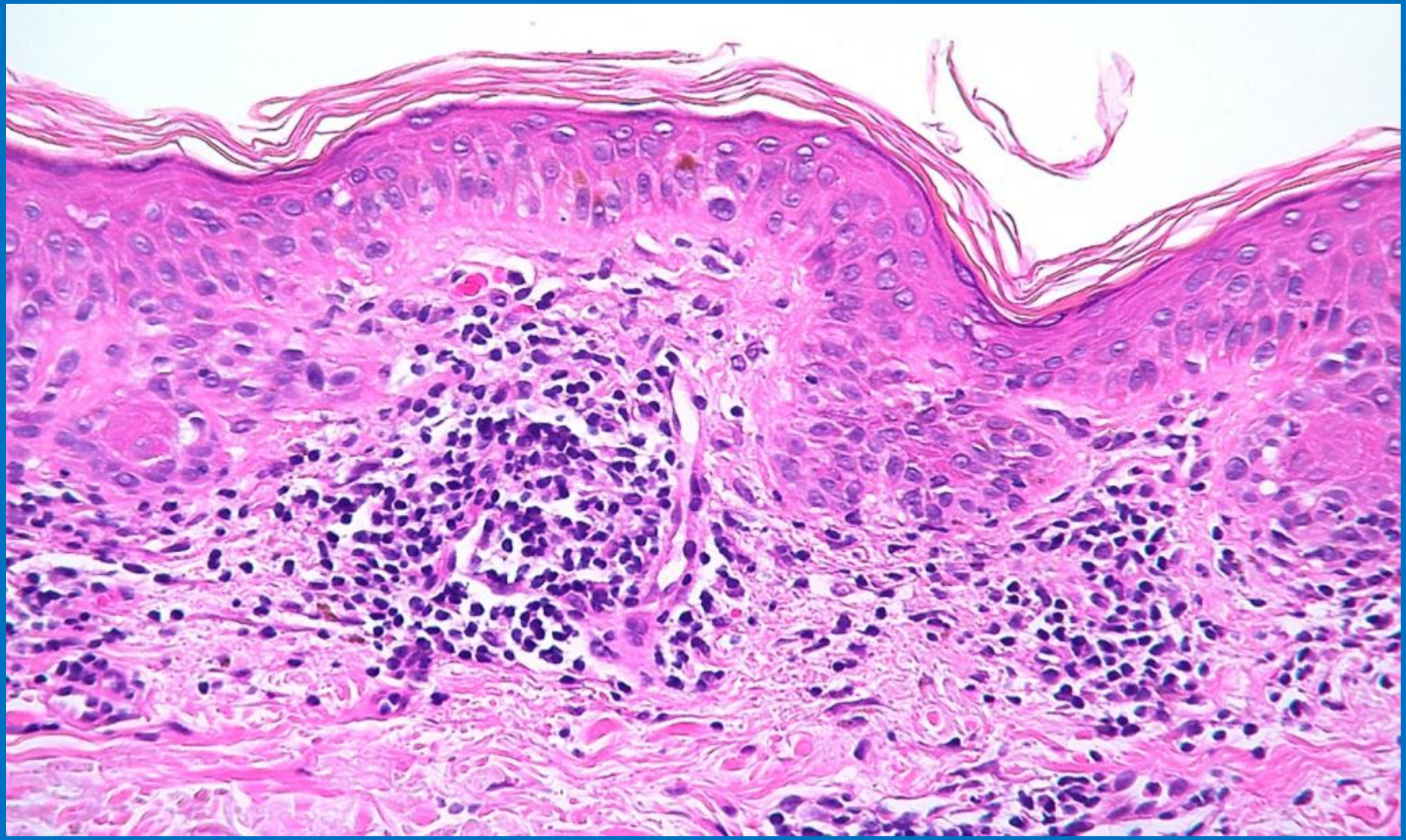
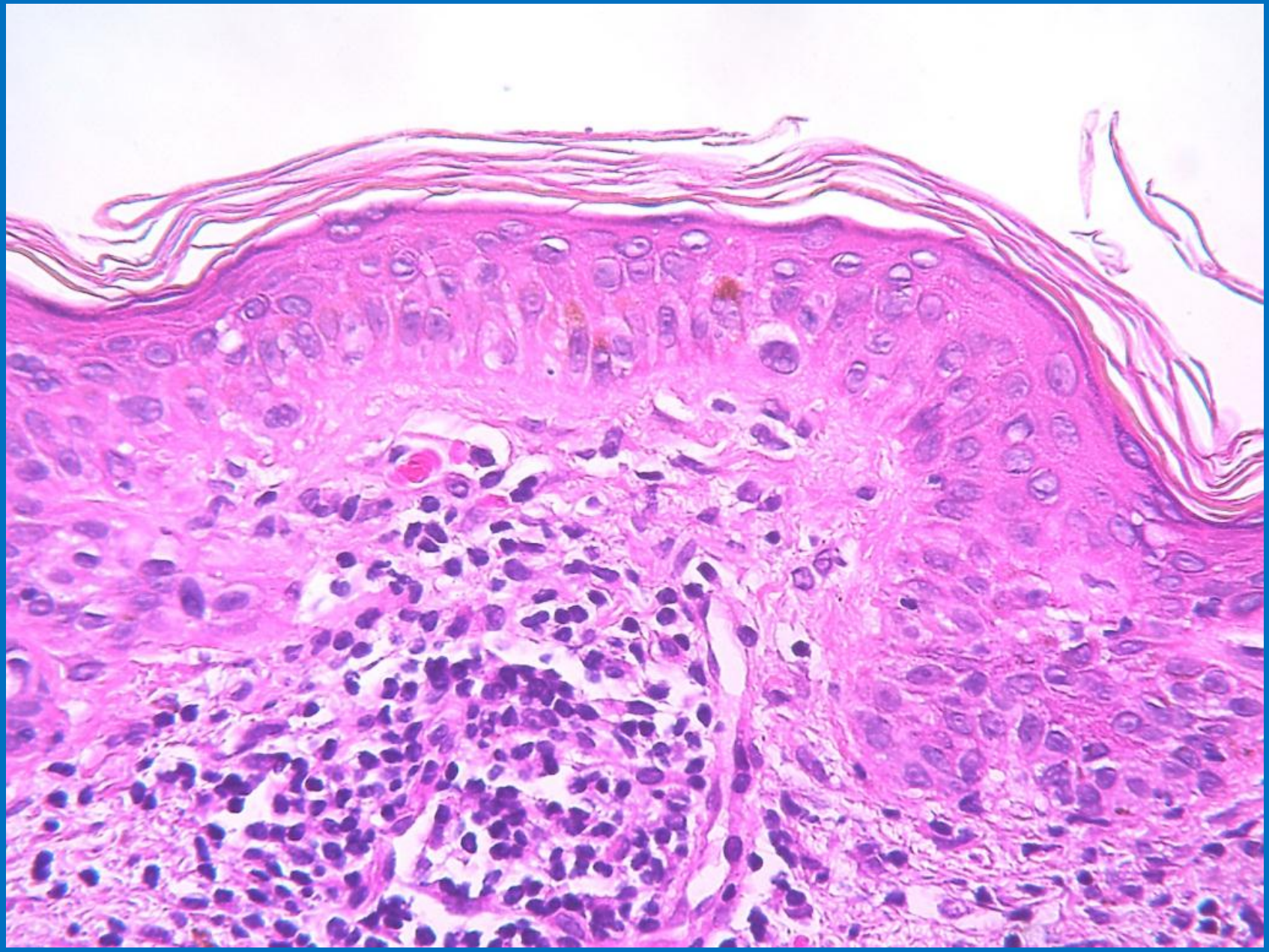
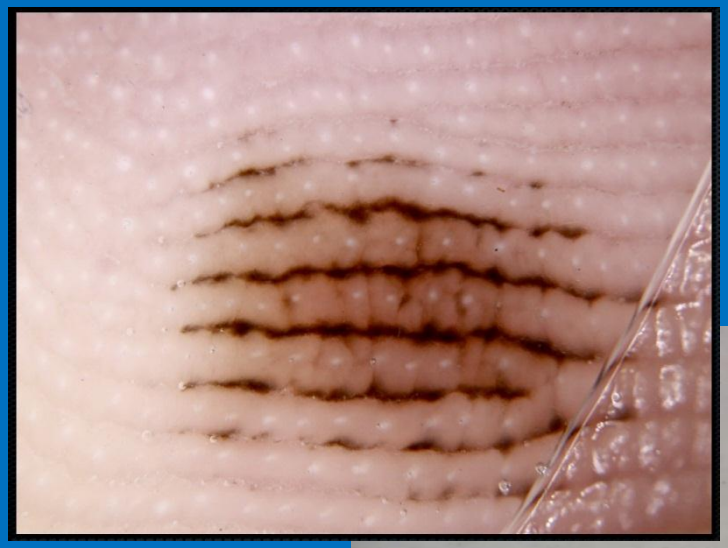


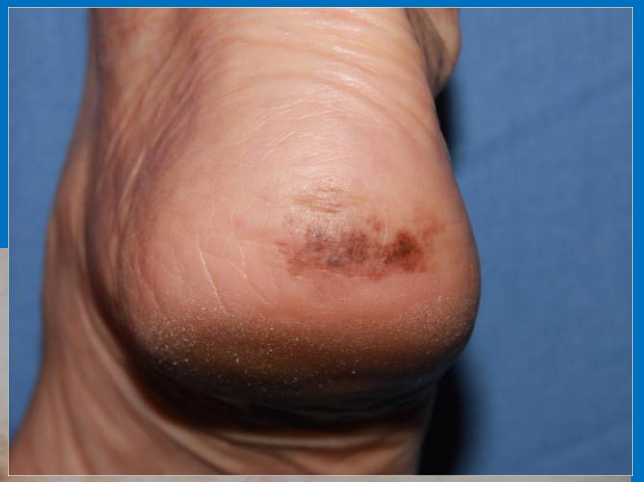


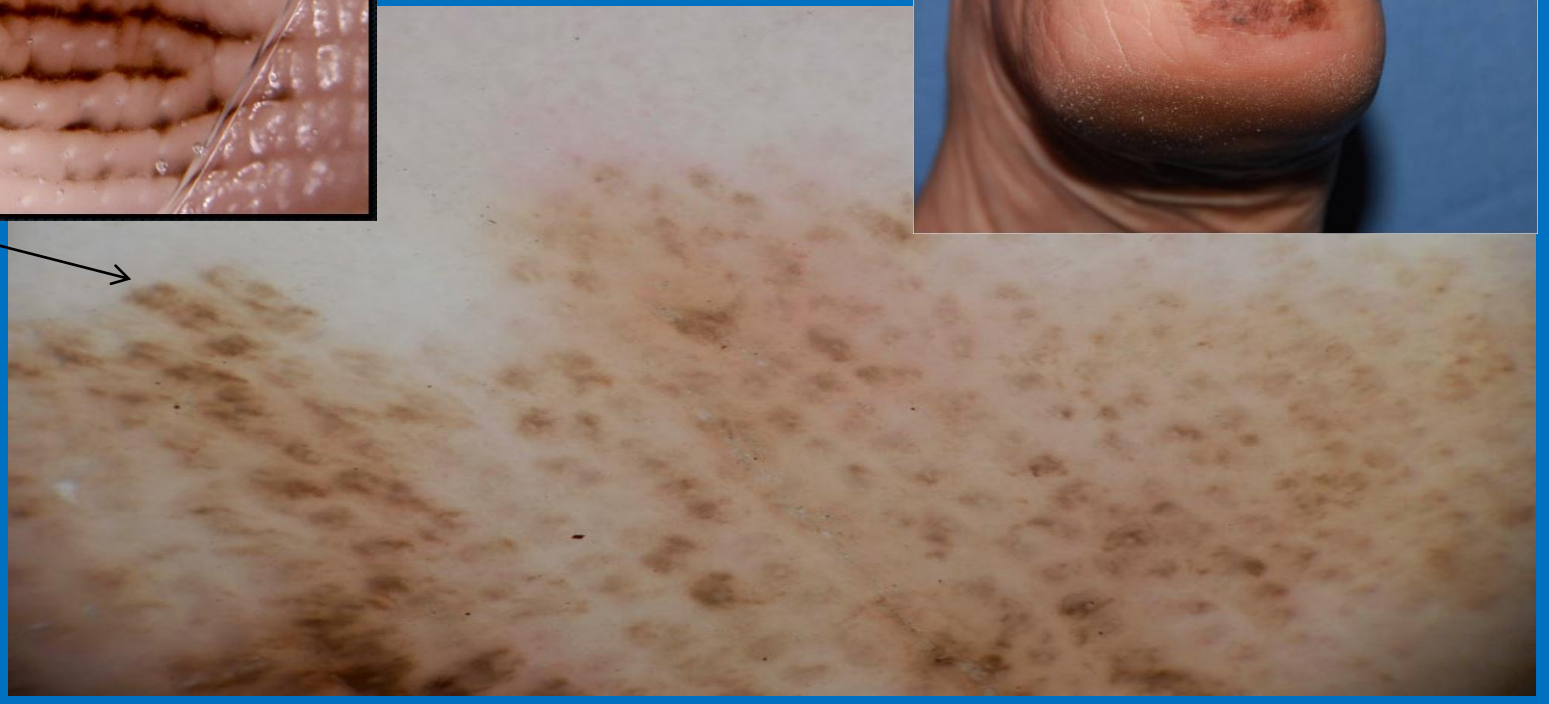




8. Lines parallel ridges, acral or chaotic, nails

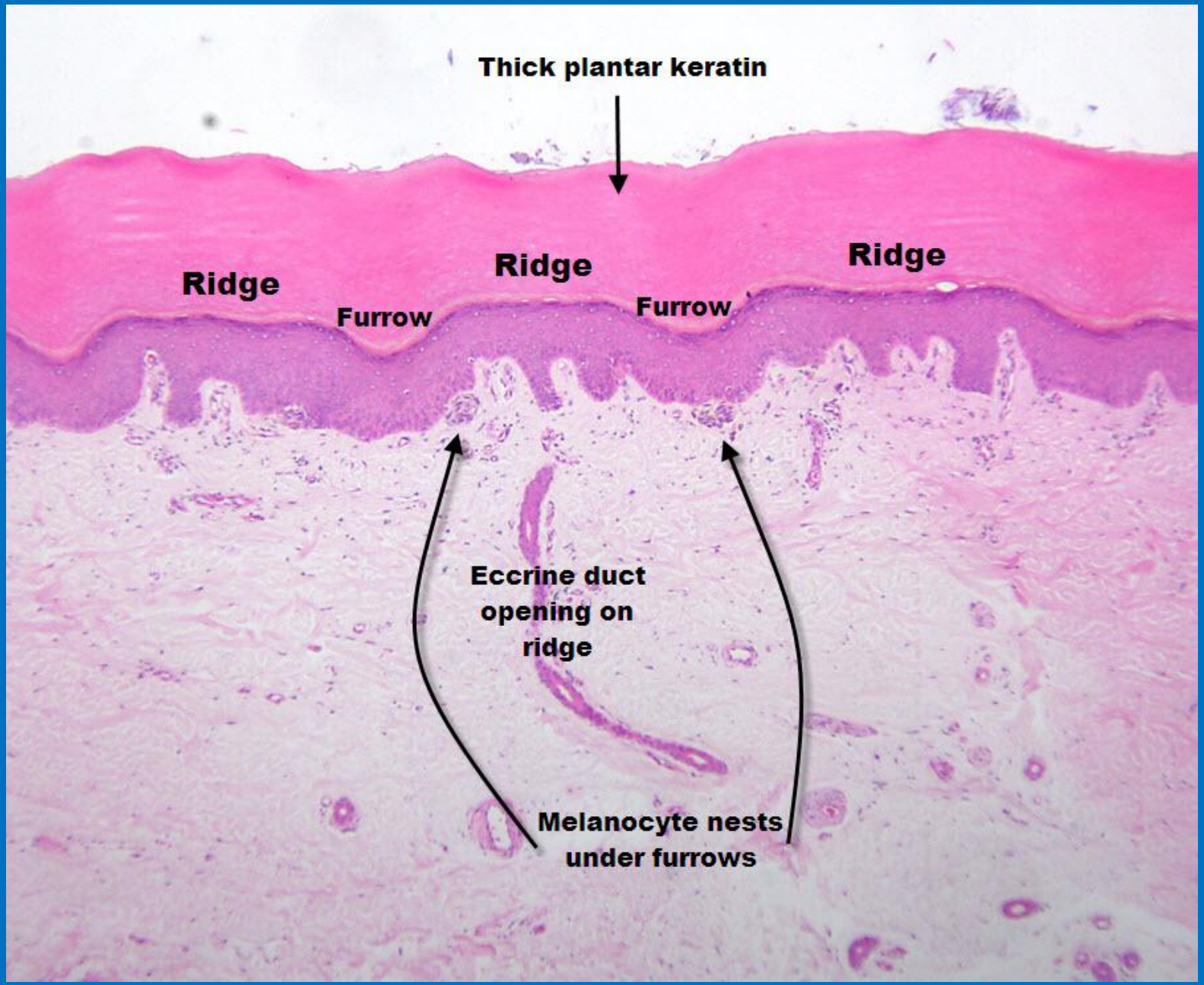






Eccrine duct openings (white dots) mark the centre of the ridges and the benign furrow pattern in the acral naevus above-left is a pattern of thin lines between the ridges. The malignant ridge pattern (below) is best appreciated at the edge (arrow) as broad pigmented parallel lines. Eccrine openings have been obliterated by the malignant infiltration. [19]


Acral Naevus



In this acral naevus the melanocytic proliferation is under the furrows

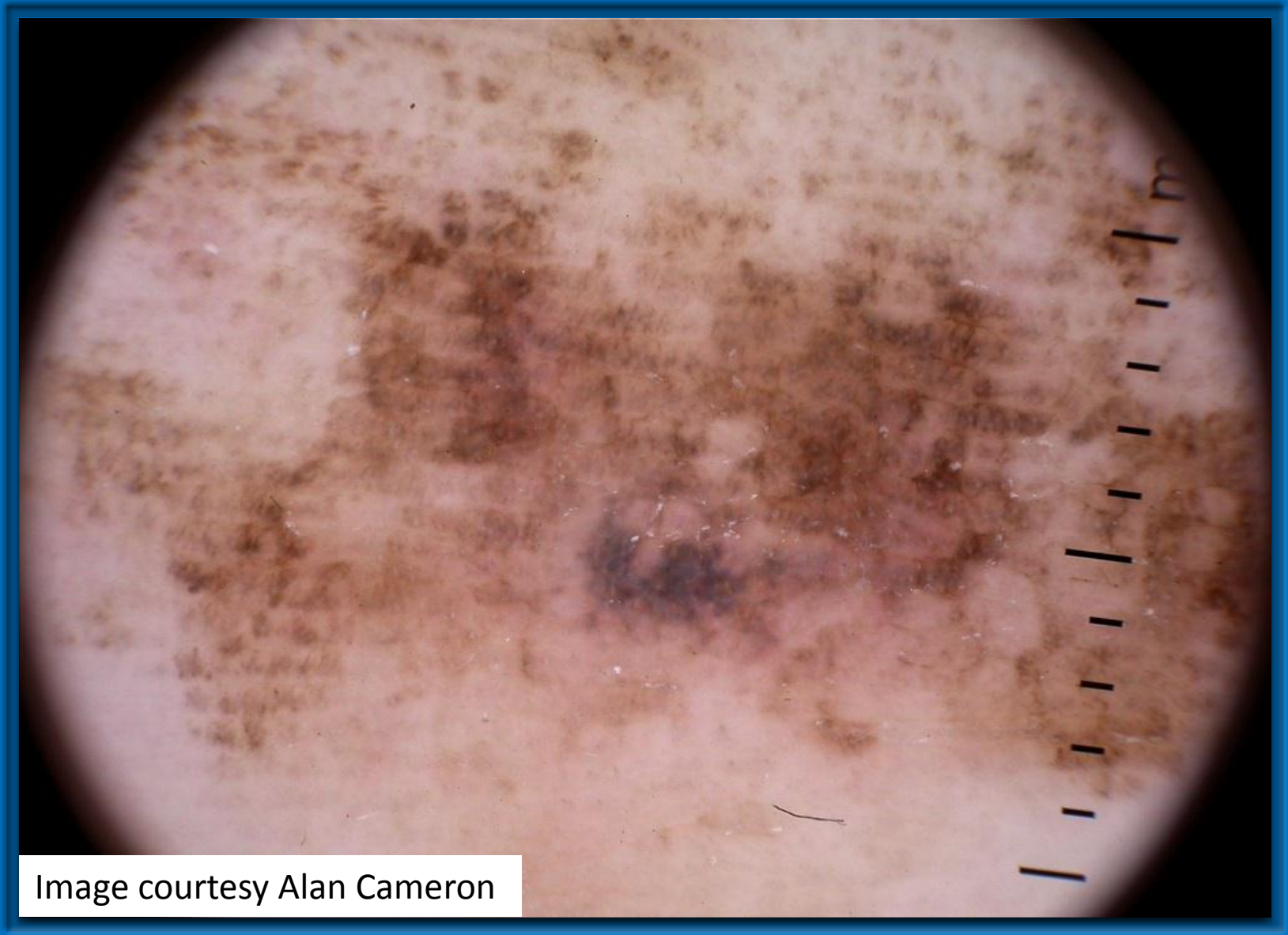


Image courtesy Alan Cameron

As an acral melanoma becomes more advanced it develops Chaos and Clues (grey) in addition to the parallel ridge pattern.

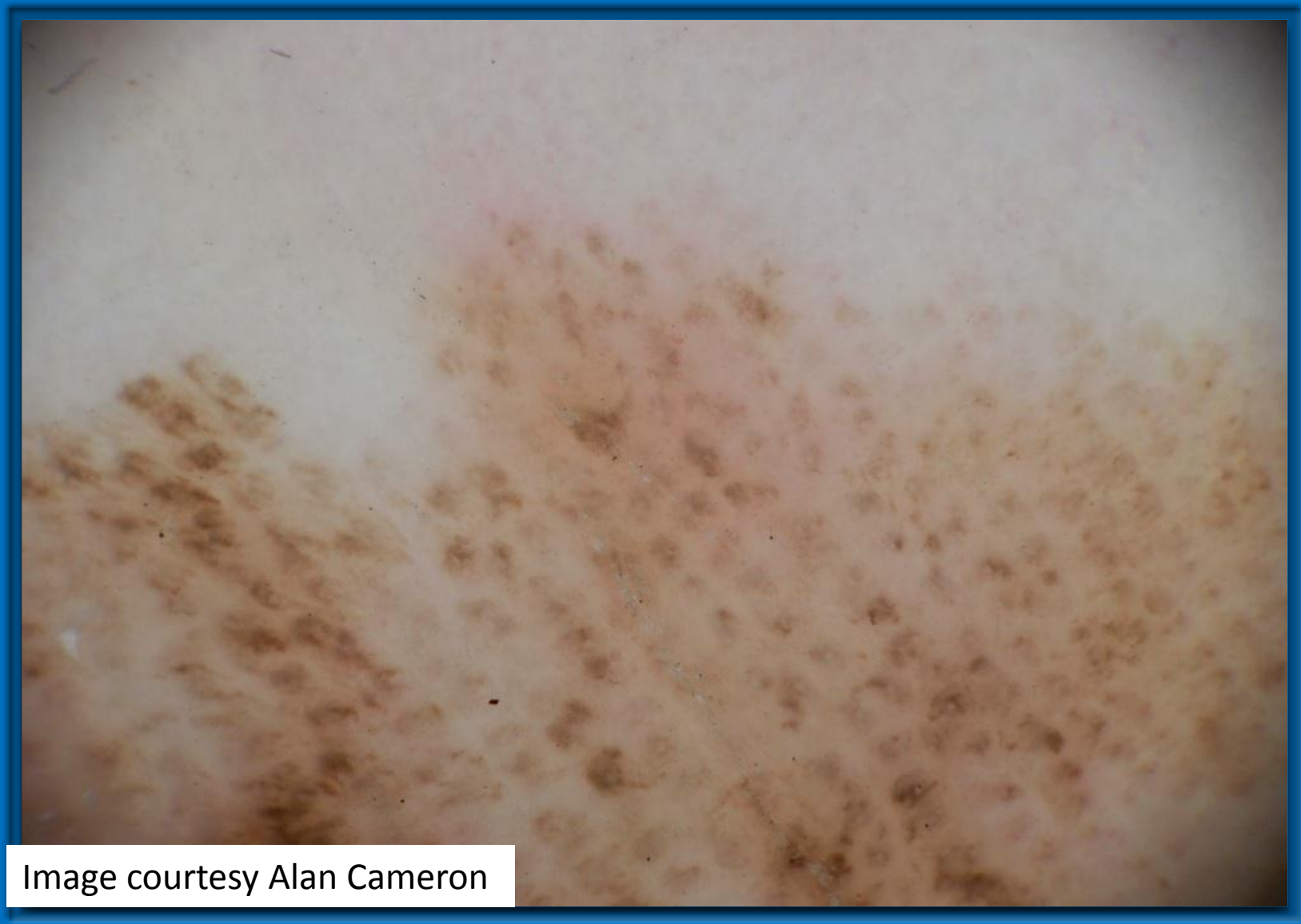


Image courtesy Alan Cameron

The parallel ridge pattern is best appreciated at the edge of this acral melanoma. It should be remembered that a melanoma can arise in an acral naevus so a parallel furrow pattern is not immunity against melanoma if other clues to malignancy are present.

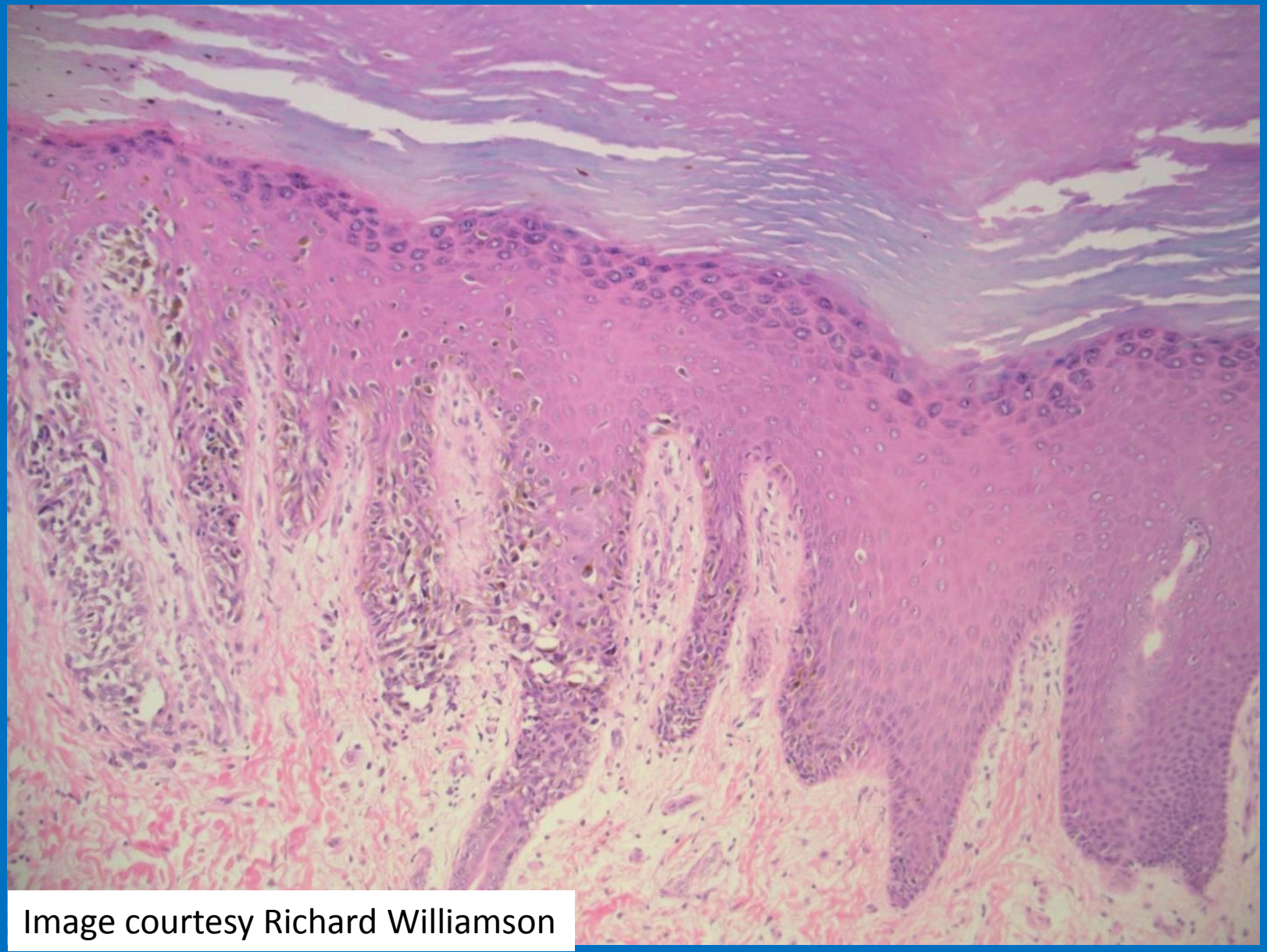


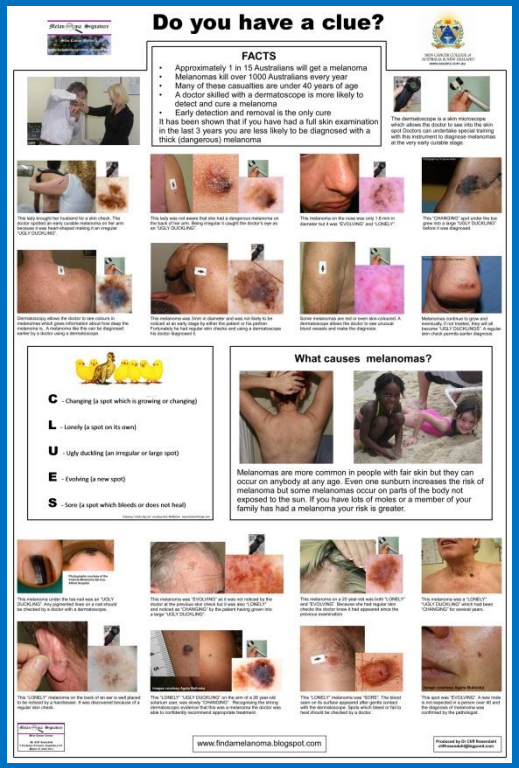
Image courtesy Richard Williamson

In this acral melanoma the melanocytic proliferation can be seen to be focussed on the eccrine duct with sparing of the furrow

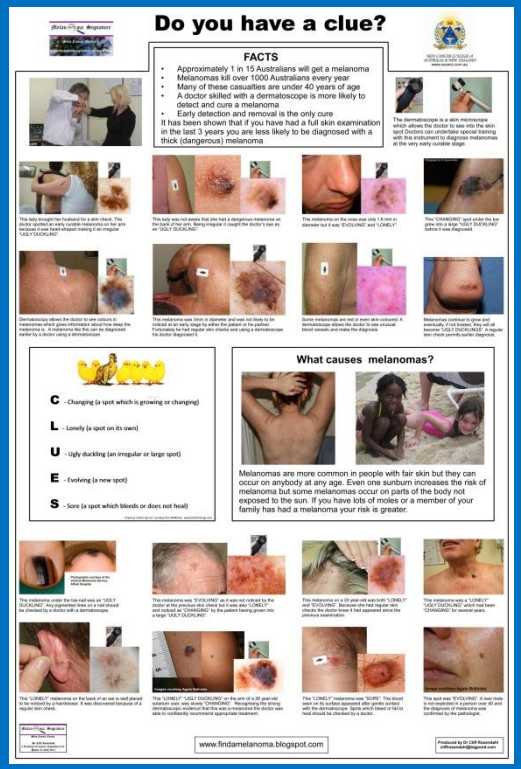
8. Lines parallel ridges, acral or chaotic, nails

Melanonychia with pigment extending from the proximal nail fold to the distal end of the nail plate. Note that the pigment stripe is wider proximally signifying a growing lesion.

Lines parallel chaotic – varying in width, interval and colour

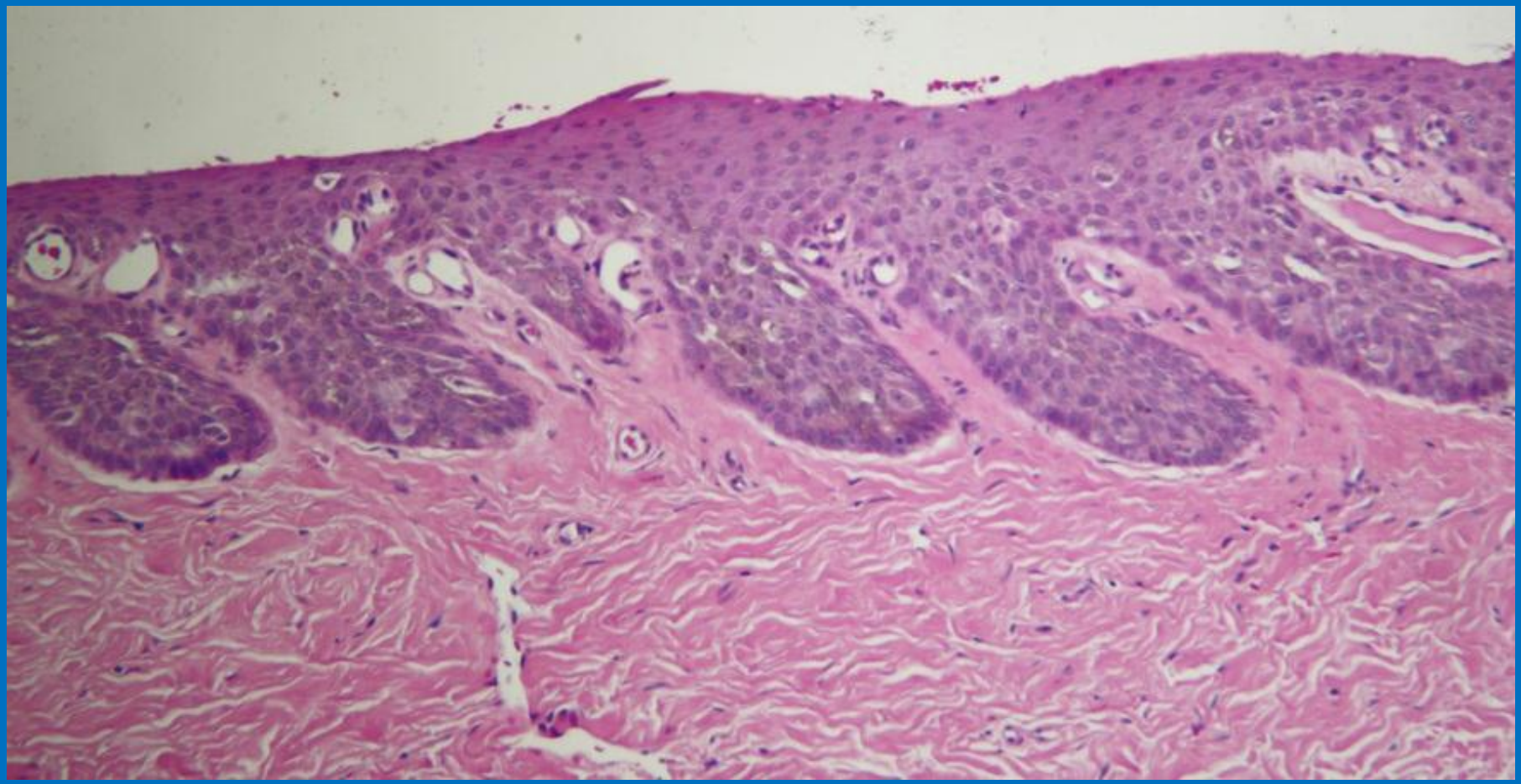


This melanoma was noted by a 13 year-old school girl (shown at a younger age to protect her identity) on the thumb nail of her 25 year old science teacher. She had seen a photo of a nail-apparatus melanoma on a patient-education poster (left) and told her teacher that his nail resembled what she had seen on the poster. The discovery on an in-situ melanoma on a young person is very significant with a melanoma sub-type that carries 50% mortality when invasive.

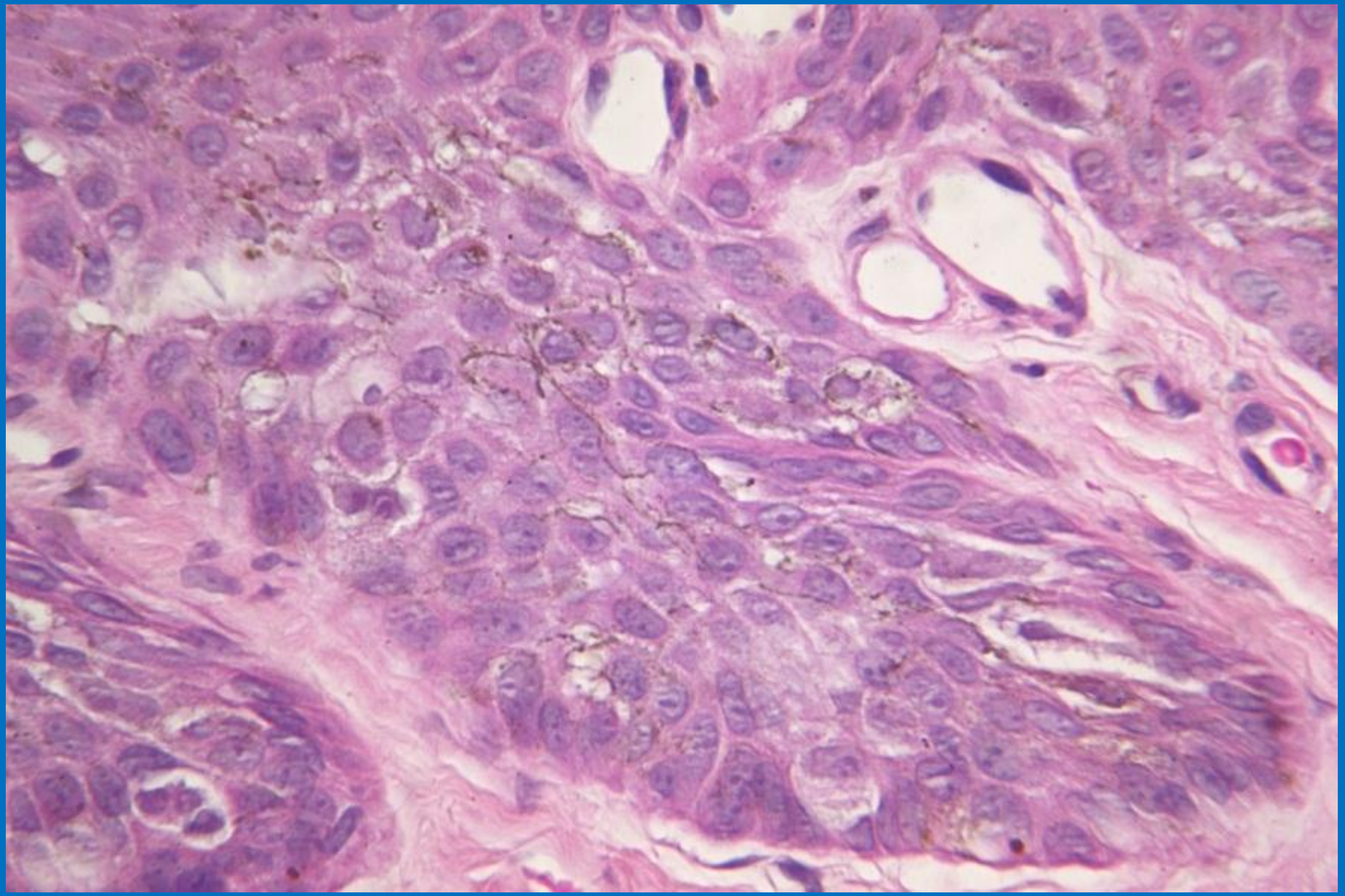


1 Poster + 1 smart kid = 1 rare melanoma

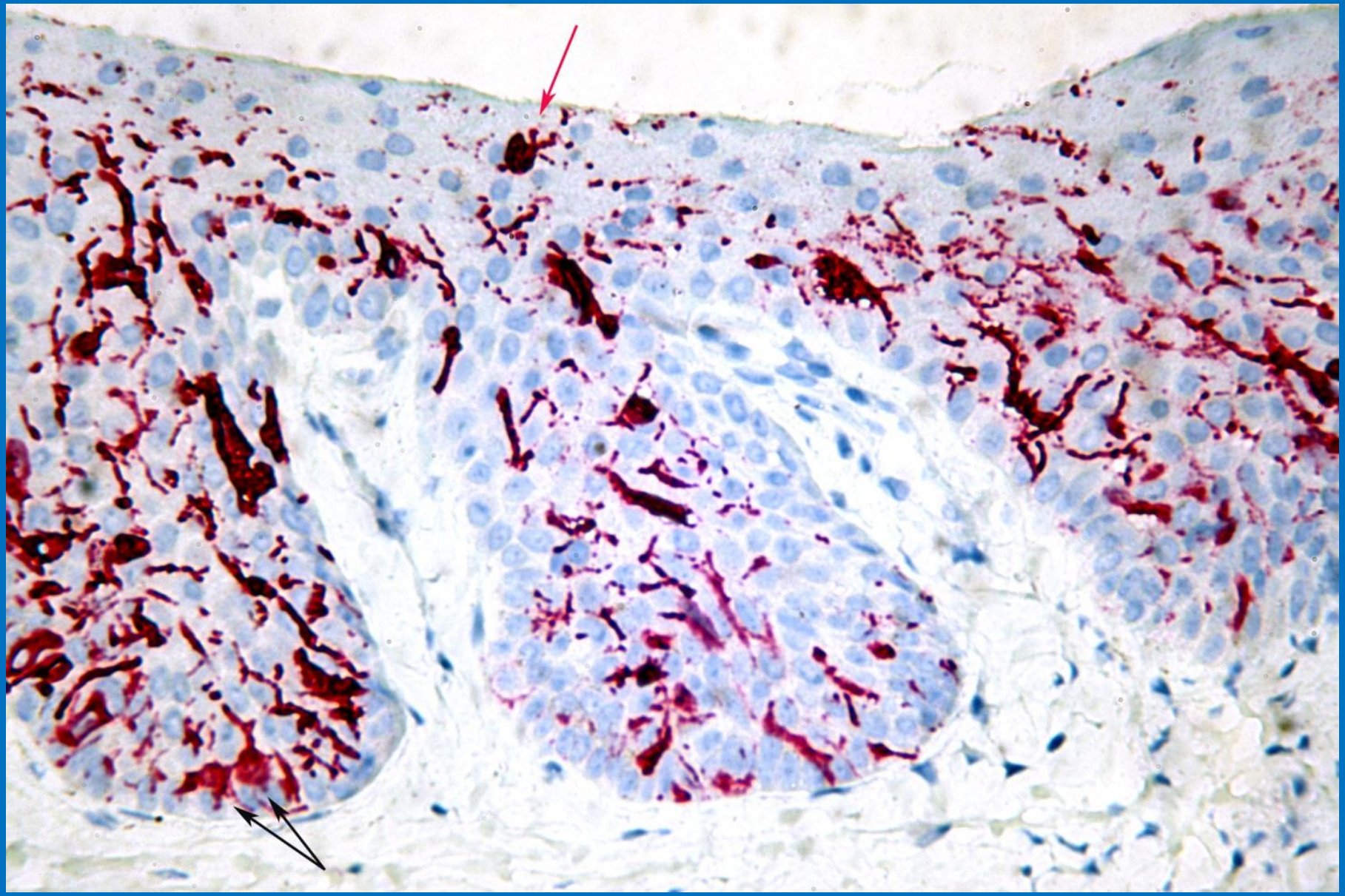
Visual impact is extremely important in patient education



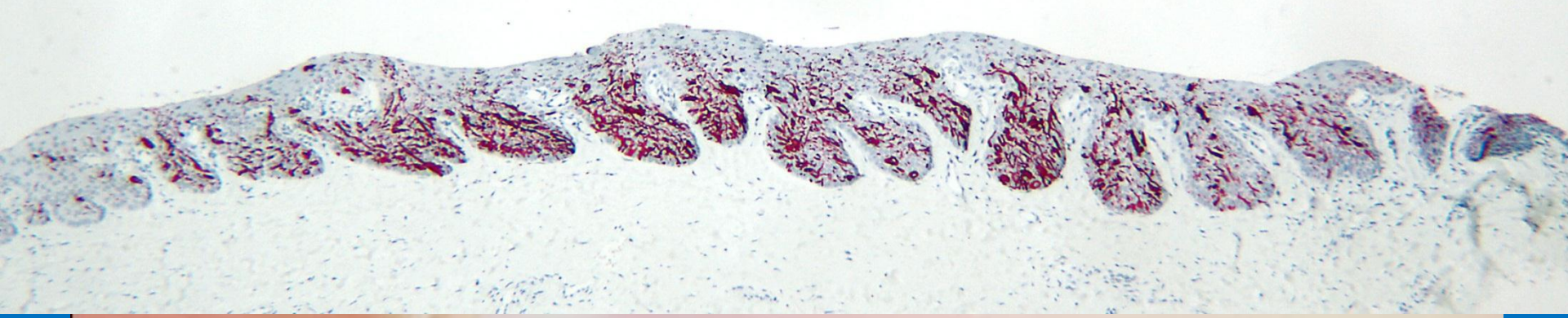
It can be difficult to see melanocytes in nail-matrix material as in this melanoma.



At higher power heavily pigmented dendrites are a clue to melanoma



Immunoperoxidase melanocyte stains remove all doubt



Rete ridges with various width and melanin density produce lines of varying width, interval and colour

DERMATOLOGY PRACTICAL & CONCEPTUAL

www.derm101.com

Nail matrix melanoma: consecutive cases in a general practice

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The most accessed article in the history of this journal [27]

Signature of an assassin

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Any new pigmentation in one nail requires careful assessment.

MELANOMA of the nail-matrix is rare with a reported incidence of about 0.1/100,000;[1] that is one in a million, (compared to approximately 49/100,000 for invasive melanomas in Australia).[2]

The reported mortality rate is higher than melanomas in general, but it is not known whether this is due to later diagnosis or more aggressive tumour behaviour.[3]

The actual malignant melanocytes in subungual melanoma are concealed beneath the proximal nail fold, but the pigment produced by these melanocytes creates a distinctive signature – longitudinal bands of pigment stretching from the proximal nail fold to the free edge of the nail plate.

While such bands of pigment (longitudinal melanonychia) can also be produced by naevi, certain drugs, ethnic pigmentation and so on, only in melanoma do these parallel lines vary in width, spacing and colour (chaos).[4]

Any new nail pigmentation in an adult involving only one nail should be carefully assessed for these features.

CLINICAL CASE:

A 25-year-old high school science teacher presented to his general practitioner at the insistence of one of his teenage students. She had noticed a mark on his right thumbnail (Figure 2a) which she said resembled a photograph of a melanoma on a poster in a local doctor's waiting room.

Dermatoscopy (Figure 2b) revealed lines parallel in the colours of melanin (black, brown, grey and blue), and the lines varied in width and interval.

The patient was informed that even though a biopsy would probably permanently damage the nail, one was needed to exclude an early melanoma. He agreed to proceed and was referred to another GP for the biopsy.

The location of the suspected melanoma was marked (Figure 3a – arrow). Under sterile conditions a digital block was performed and a tourniquet applied.

The proximal nail fold was incised on each side, separated from the nail plate with a sweep of the scalpel and retracted with two sutures (Figure 3b).

A 6mm biopsy punch was used to remove a plug of nail plate overlying the nail-matrix, revealing a deeply pigmented lesion. This was removed as an excision biopsy using a 4mm biopsy punch.

The deep edge required dissection from periosteum, taking extreme care not to damage the delicate specimen.

The nail fold was laid back over the defect and the incisions on each side of the nail fold were secured with 5/0 nylon sutures.

The laboratory was informed by phone, as well as on the pathology form, that the specimen consisted of both nail matrix and nail plate, as each requires different processing.

The pathologist confirmed level 1 acral lentiginous melanoma of the nail matrix.

Definitive treatment required excision of the total nail-unit with graft reconstruction, performed by a plastic surgeon. Thumb amputation was averted and the prognosis is excellent.

References at **medobs.com.au**

Practice points

1. Adult onset of longitudinal melanonychia is suspicious for melanoma.
2. Longitudinal melanonychia with chaotic parallel lines requires biopsy.
3. The actual tumour lies beneath the proximal nail fold.
4. The location and quality of the biopsy is critical for an accurate histological diagnosis. An excision biopsy under direct vision is recommended, rather than blindly punching through the nail. Consider specialist referral.
5. The value of patient education cannot be overestimated!

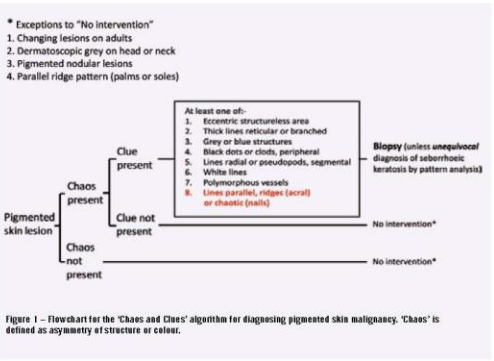


Figure 1 – Flowchart for the 'Chaos and Clues' algorithm for diagnosing pigmented skin malignancy. 'Chaos' is defined as asymmetry of structure or colour.

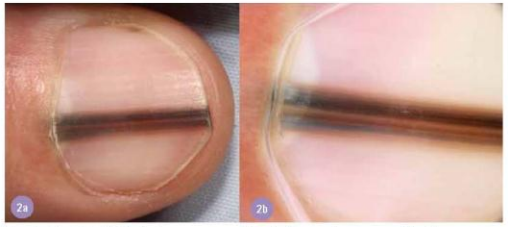


Figure 2a: The patients right thumbnail.

Figure 2b: Dermatoscopic appearance of the nail.

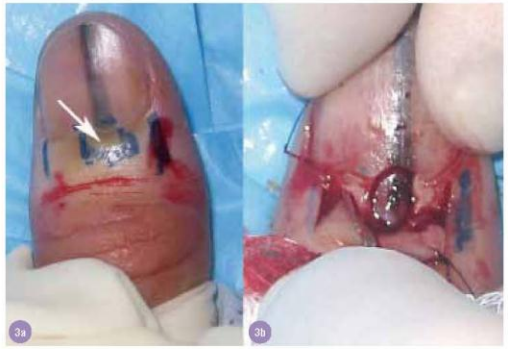
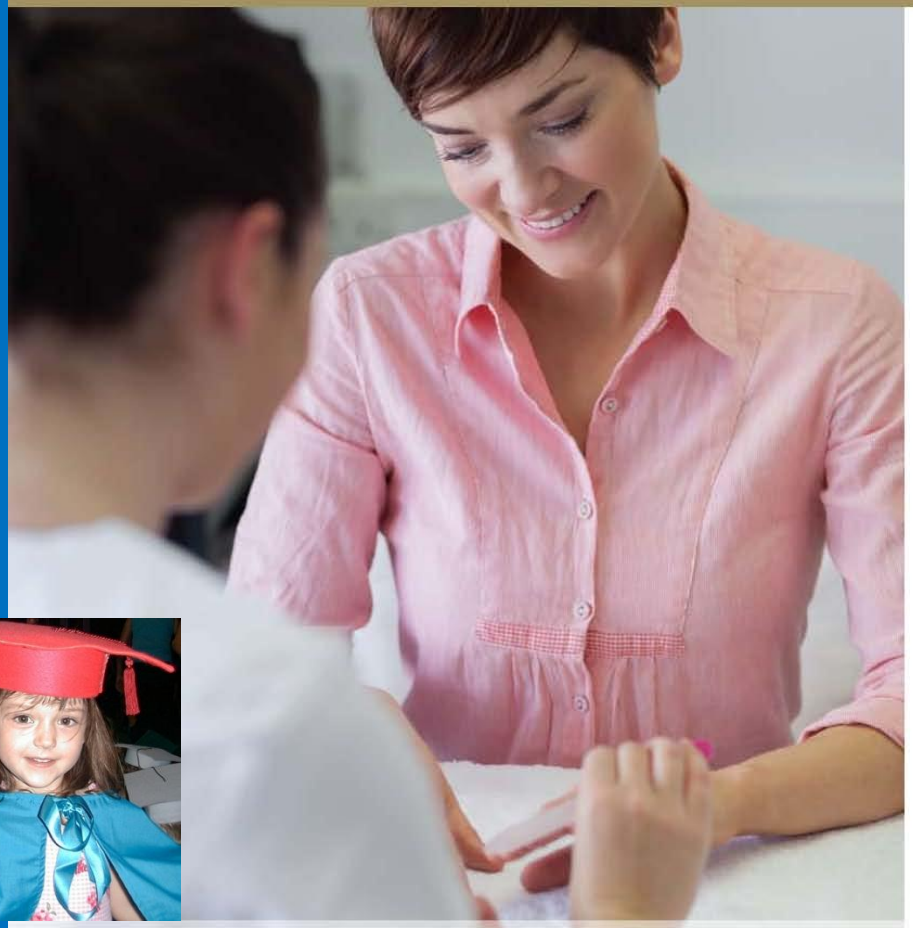


Figure 3a: Proposed biopsy marking.

Figure 3b: The nail fold incision.

Circulated to every primary care doctor in Australia.

ON FILE: INDUSTRY NAIL NEWS



MALIGNANT NAIL ART...

"Malignant melanoma writes its message on the skin with its own ink..."

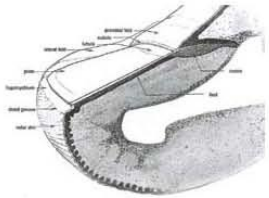
This statement by Australian surgeon and researcher Dr Neville Davis in 1978 is known as the 'Melanoma Signature' statement. It draws attention to the fact that while melanoma kills around 1500 Australians every year, many of these deaths can be prevented if the distinct signature of the melanoma is recognised at an early stage. The person who recognises that 'signature' does not need to be a doctor. Family members, friends and non-medical professionals such as beauticians and massage therapists are well placed to recognise the signature of a melanoma if they are informed and observant.

TO SIR WITH LOVE...

A 13 year old school-girl had seen a poster in a doctor's waiting room which presented images of melanomas including a nail-apparatus melanoma. She told her 25 year-old science teacher that the stripe on his thumbnail (figure 1) looked similar to the melanoma she had seen on the poster.

The school teacher had been observing the stripe on his thumbnail slowly widen over a period of 12 months and prompted by the comments of his student he consulted his general practitioner who arranged for a biopsy to be performed. This confirmed the presence of a malignant melanoma at the early stage before the blood vessel layer of skin (dermis) had been invaded. Amputation was therefore not necessary and the subsequent excision of the nail bed was a curative procedure

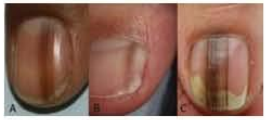
NAIL-MATRIX MELANOMAS...



Nail-matrix melanomas are not common and this may be one of the reasons they are so deadly. While the death rate from invasive melanoma in Australia is around 10% it is closer to 50% for nail-matrix melanomas. Melanomas initially are confined to the epidermis and at that 'in-situ' stage they are cured by surgical removal. Once melanomas invade the dermis they can spread through the blood and lymphatic vessels which are present in that layer of skin, with deadly consequences. The risk of this metastatic spread increases as the melanoma invades more deeply. The only way to prevent death from melanoma is to detect and surgically remove the melanoma before it spreads through blood and lymphatic vessels and that means detecting it as soon as the 'signature' appearance can be recognised.

There are some benign (harmless) conditions that produce pigment stripes in nails and these are more common in people with darker skin type and they frequently involve more than one nail. Melanoma should be suspected if a single nail is involved and especially if the stripe has appeared after the age of puberty and if the client reports that the stripe has been widening.

Beauty Therapists see a lot of nails close-up. Familiarisation with the clues to malignancy may provide an opportunity to do more than give beautiful nails to clients; it may provide an opportunity to give the gift of life.



Unfortunately not all nail-matrix melanomas are pigmented. Non-pigmented (amelanotic) melanomas can occur on any skin surface including the nail matrix. While there will not be any pigment stripe, the clue may be that there is repeated bleeding under the nail without any history of injury as in figure 4(A) or that there is a single nail is growing abnormally and that the abnormality is progressively widening as in figure 4(B).

REMEMBER THIS...

1. Not all melanomas are caused by the sun. Melanomas that may be discovered by beauty therapists include melanomas in the nail-matrix and also melanomas on the palms and soles. Unlike other more common melanomas these types occur just as frequently in people with dark skin type.
2. Clients often do not appreciate gradual pigment changes in unexpected places like nails. They will usually however take notice of a professional person who they trust.
3. Being alert to the tell-tale 'signature' of nail-matrix melanomas once you have been informed is as easy as staying awake!

For more information go to www.findamelanoma.blogspot.com.au

LEGENDS

Figure 1: A pigment stripe is seen on a 25 year old school teacher's thumbnail. It occupies the entire length of the nail-plate from the cuticle to the free edge of the nail. It is wider at the cuticle indicating that there is a growing tumour in the nail matrix which lies beneath the nail at the site indicated by the arrow. The pigment stripe is the 'signature' of this melanoma which was recognised– not by a doctor – but by an observant teenager.

Figure 2: Schematic drawing of the nail-apparatus. The nail matrix can be seen under the nail-plate and proximal nail-fold. Melanomas arise in this nail matrix and they can transfer their pigment to the growing nail causing the distinctive stripe which extends the full length of the nail.

Figure 3: Three examples of pigment stripes on (A) an index finger, (B) a big toe and (C) a thumb (Image courtesy Dr Paul Fishburn). Whenever a pigment stripe is seen running the full length of a nail, and when only one nail is involved, melanoma of the nail-matrix should be suspected. These three examples of nail stripes were all due to melanomas of the nail matrix.

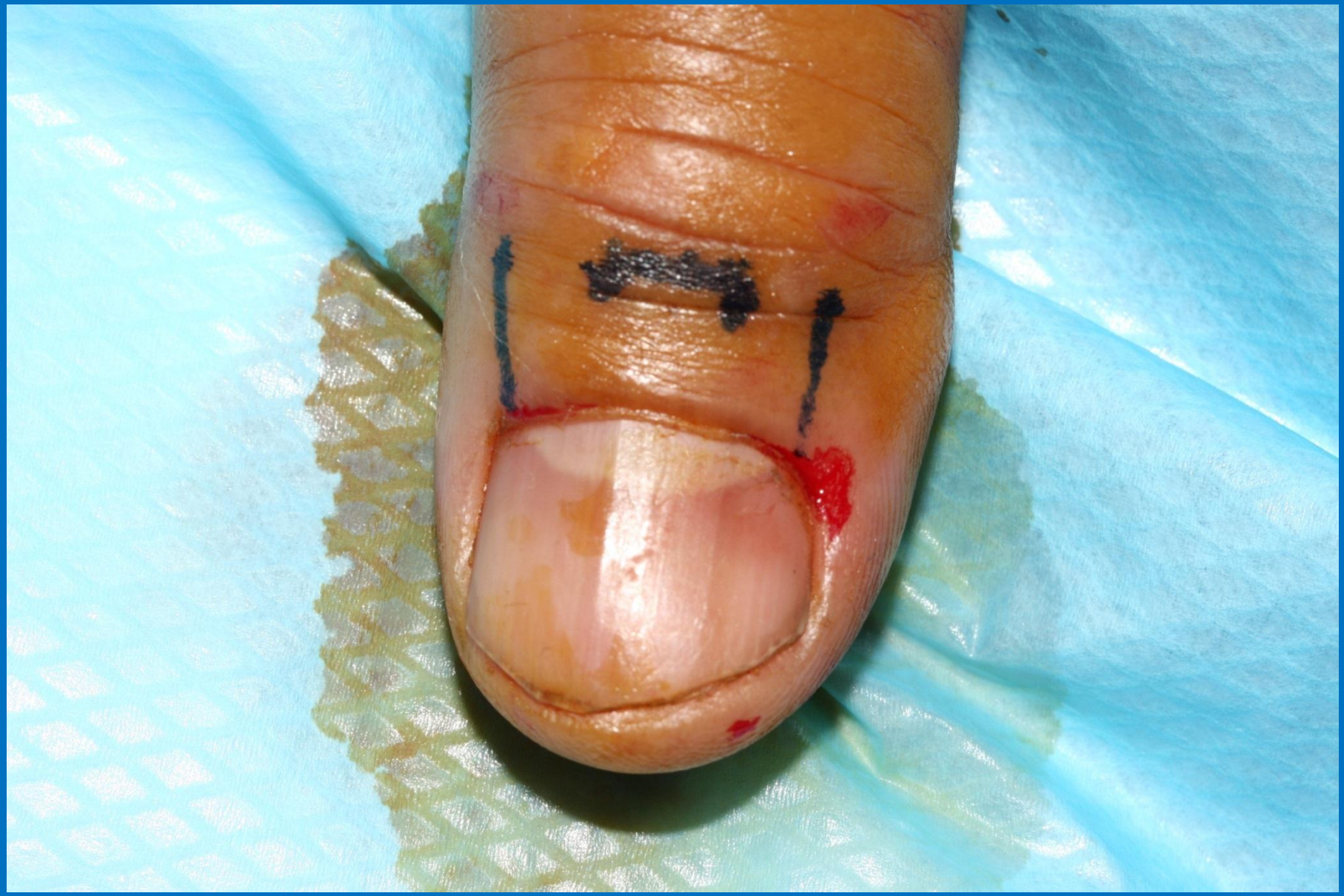
Figure 4: Amelanotic nail-matrix melanomas like the two pictured here (A) on a big toe (Image courtesy Dr Agata Bulinska) and (B) on a finger, are likely to be detected at a more advanced stage.

By Dr Cliff Rosendahl MBBS PhD FSCCA
Associate Professor, School of Medicine, the University of Queensland.

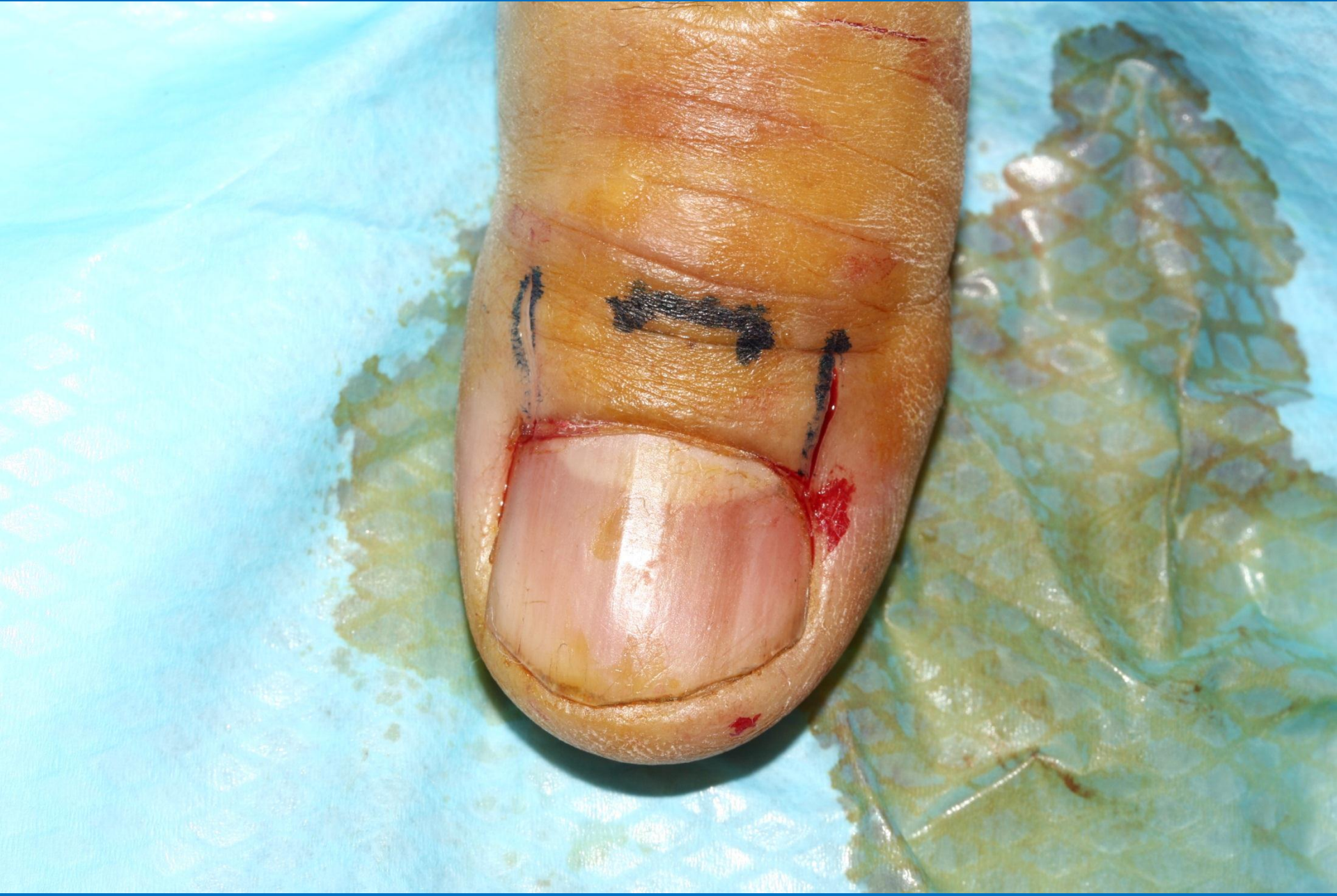
Pop the bonnet...

Cliff Rosendahl Alan Cameron Luc Thomas

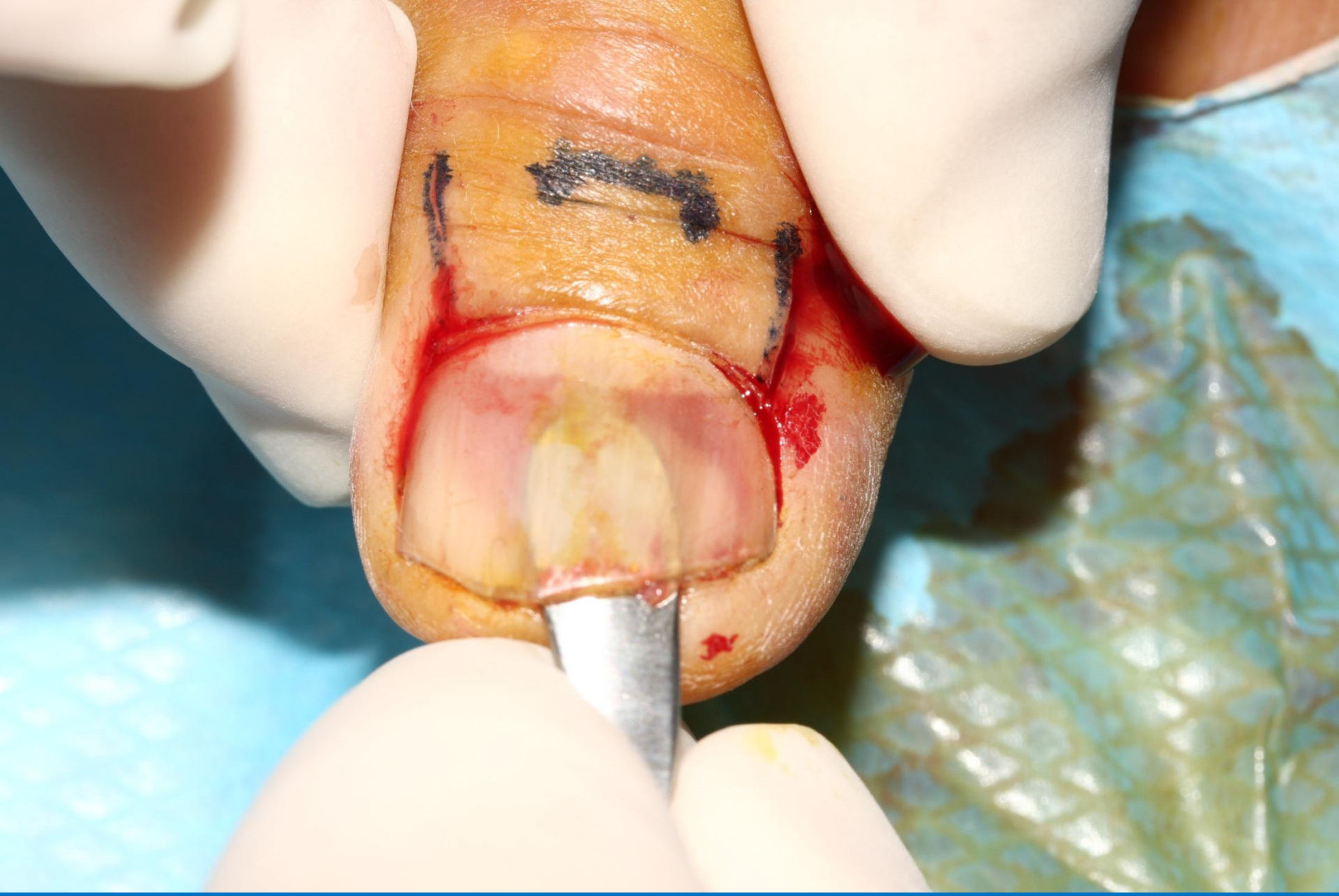
This is the preferred method of nail-matrix biopsy of Professor Luc Thomas, Lyon, France
For assistance with diagnosis go to https://myhclpro.chu-lyon.fr



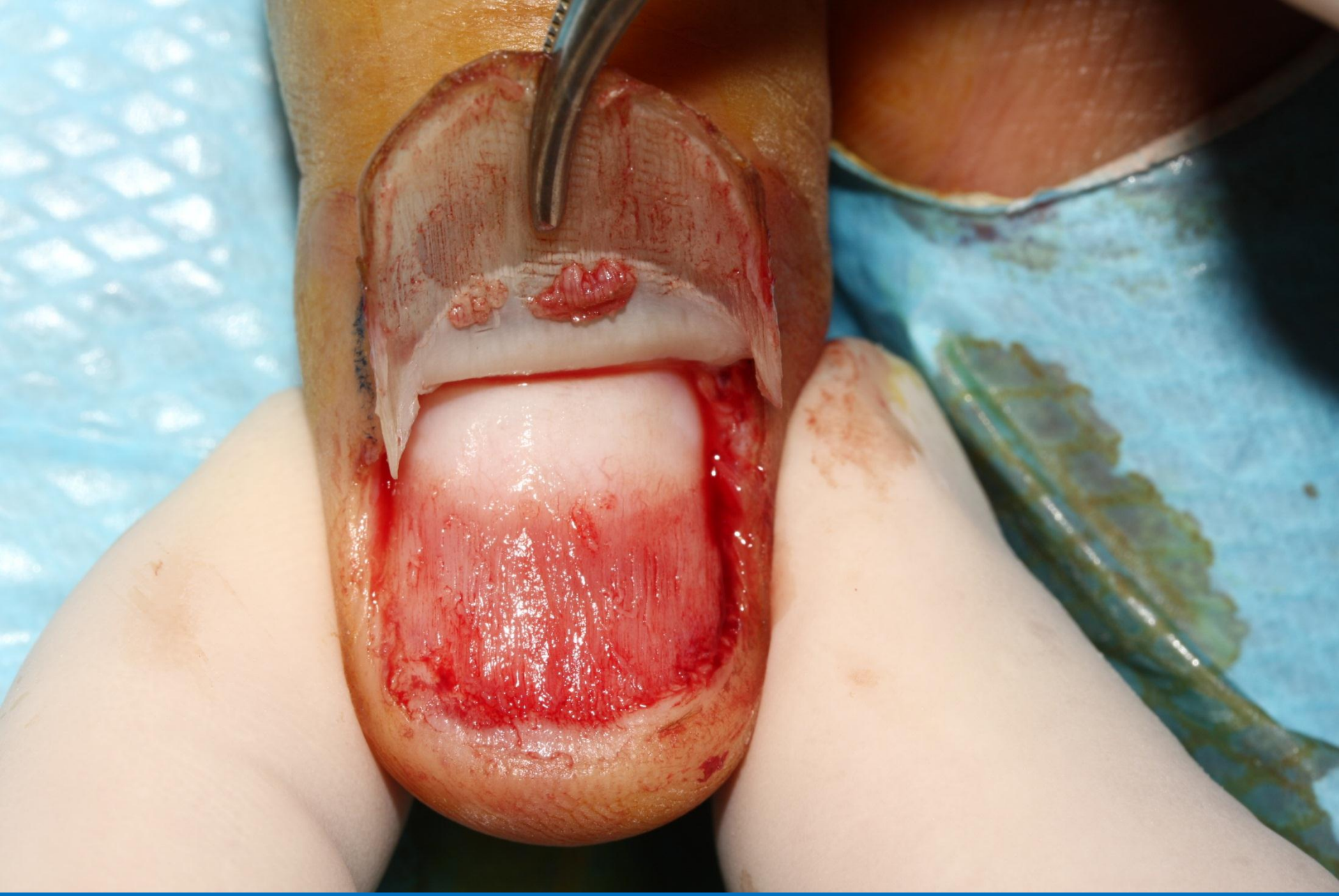
A digital block with 2% plain xylocaine has been performed. After waiting 20-30 minutes a tourniquet is applied. The extent of the subtle melanonychia has been marked as have the locations of intended incisions in the proximal nail-fold



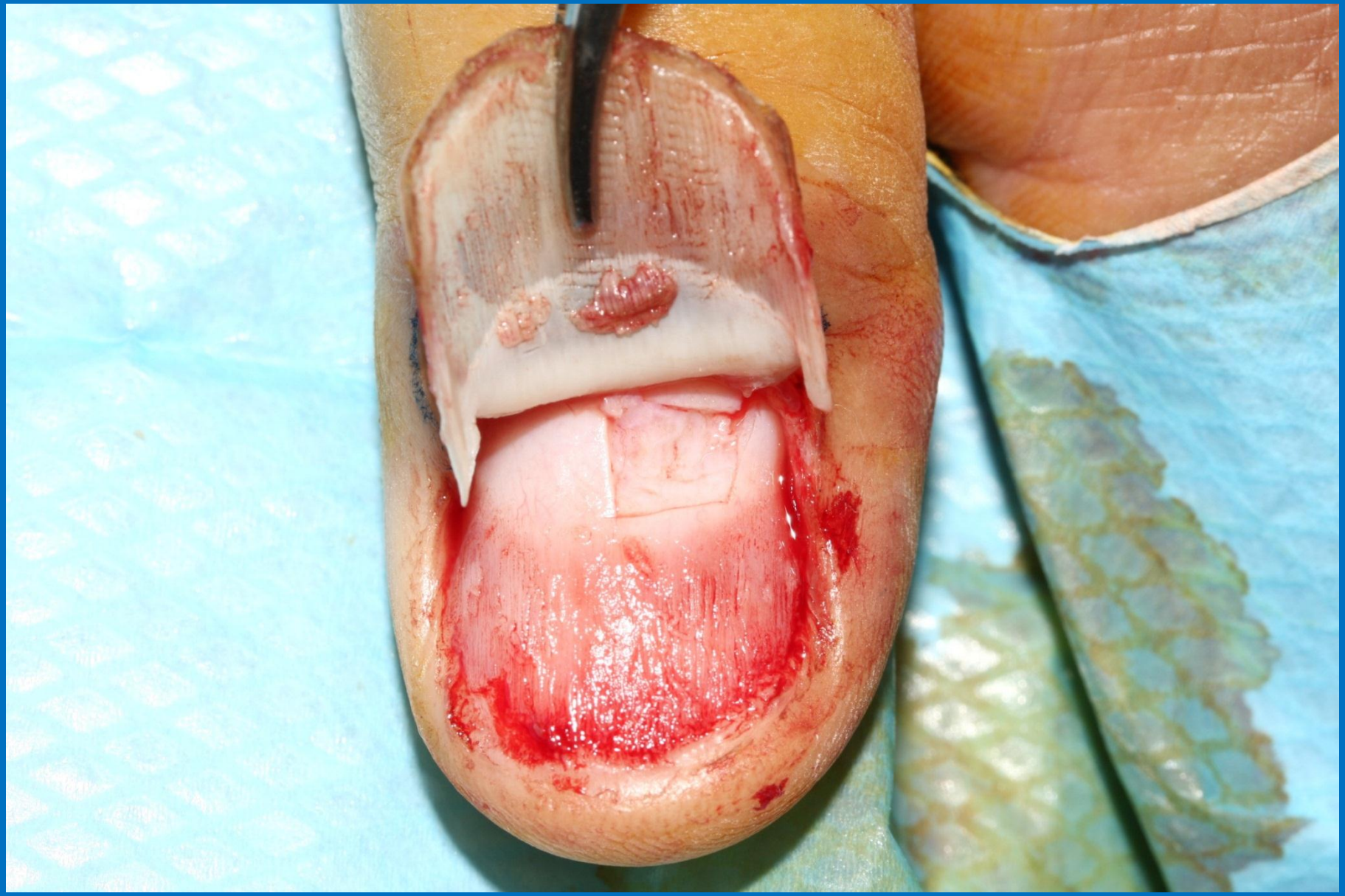
The incisions are made all the way to the nail plate



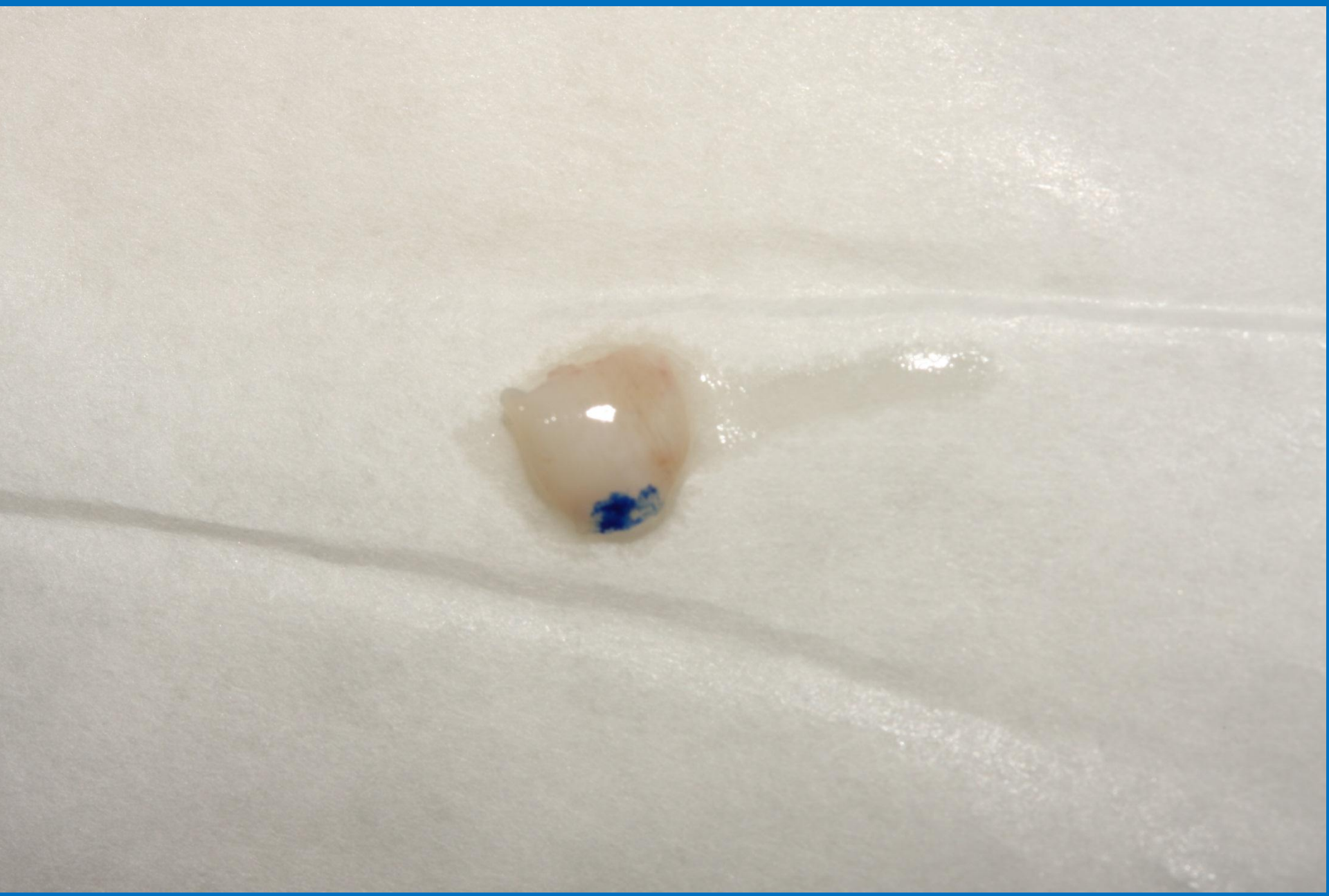
The nail plate is separated from the nail bed with a Freer elevator taking care not to penetrate past the lunula which marks the distal extremity of the nail-matrix



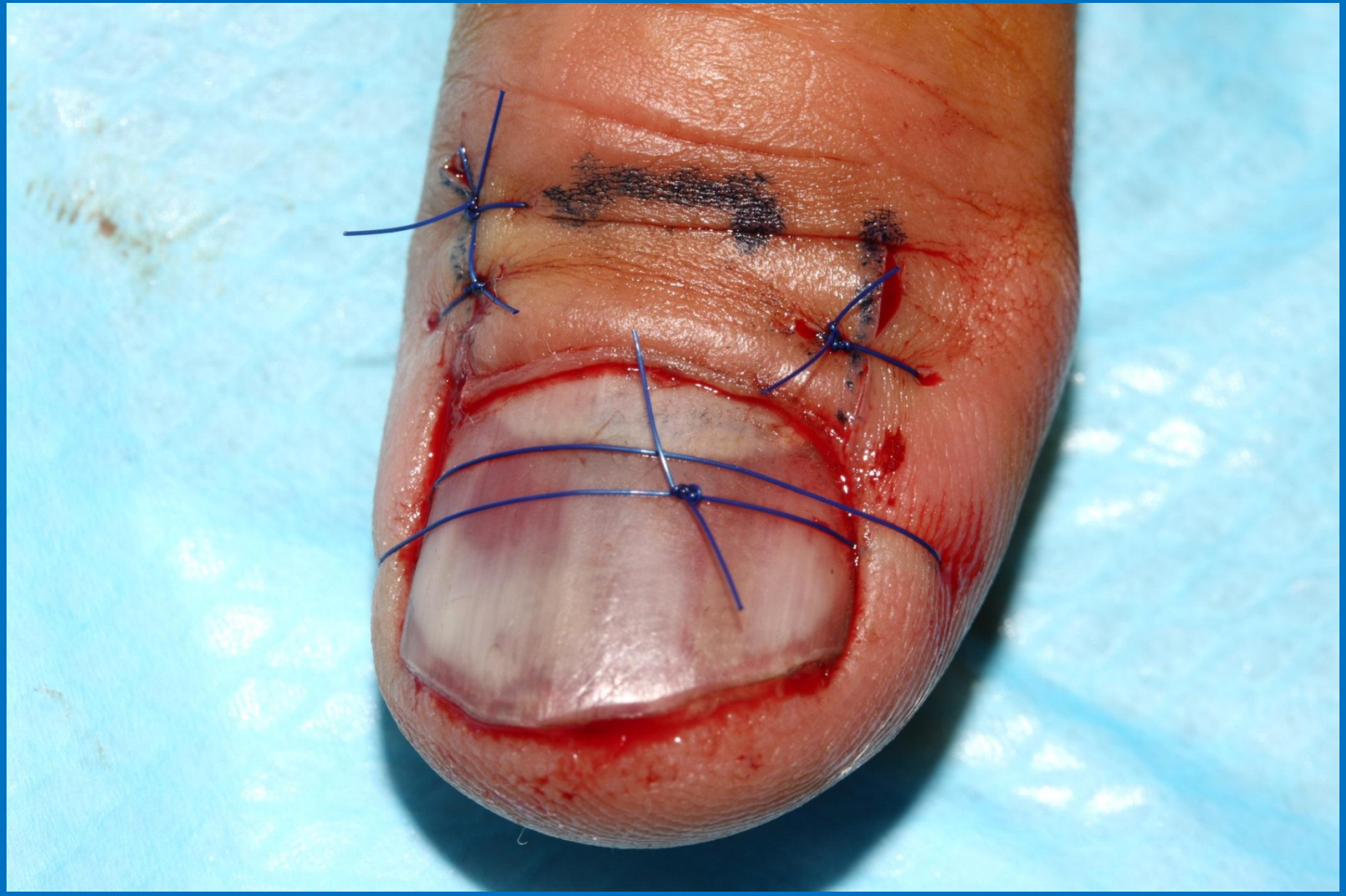
Elevation of the nail plate gives an complete view of the nail-bed and nail-matrix



The pigmented area on the nail matrix is circumscribed with a scalpel then shaved off approximately 1mm thick. The patient is warned to expect dystrophy if further treatment is not necessary but this is minimised by limiting specimen thickness to 1 mm.



The distal end of the specimen is marked with ink to facilitate sectioning longitudinally



The nail plate is lowered into its anatomical position and sutures are placed as shown. Sutures are removed after one week. The nail will separate in a month or so and should be secured with a narrow band of surgical tape in the meantime to prevent “popping”

"Occult" Melanocytes in Nail Matrix Melanoma

To the Editor:

Although there is little need these days to encourage the further use of immunohistochemistry in the study of nevomelanocytic lesions, there is one group of such lesions in which its use is essential to ensure the correct diagnosis—pigmented lesions of the nail bed/matrix.

Longitudinal melanonychia (melanonychia striata in longitudinem) is a not uncommon clinical problem that may result from a melanotic macule or nevus of the nail bed/matrix or from an early stage of subungual melanoma. Nail streaks are also common in dark-skinned people adding to the diagnostic confusion in this area.

The pathologic findings may also be difficult to interpret with the distinction between a melanotic macule and an early acral lentiginous melanoma problematic. A 2-mm biopsy from the advancing edge of a melanoma may be particularly difficult to diagnose as there is often no cell crowding and the melanocytes are difficult to discern from

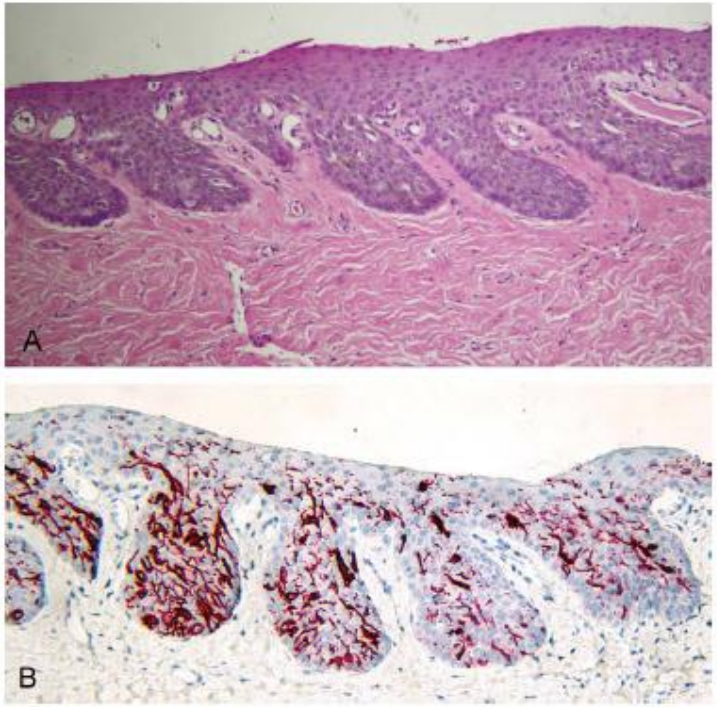


FIGURE 1. Nail matrix melanoma. A, Melanocytes are difficult to discern in this hematoxylin and eosin preparation (original magnification ×100). B, Melanocytes, some plump, are easily recognized in this same case using a "Melanoma Cocktail" preparation with a red chromogen (original magnification ×100).

melanocytes is highlighted by these immunohistochemical stains (Fig. 1). Furthermore, the older (central) area of the lesion is much more likely to be diagnostic than the newer (advancing edge)

Skin Laboratory, Sullivan Nicolaides Pathology, Brisbane, Australia
Cliff Rosendahl, MBBS
School of Medicine, University of Queensland, Brisbane, Australia

‘…each person should develop their own method’

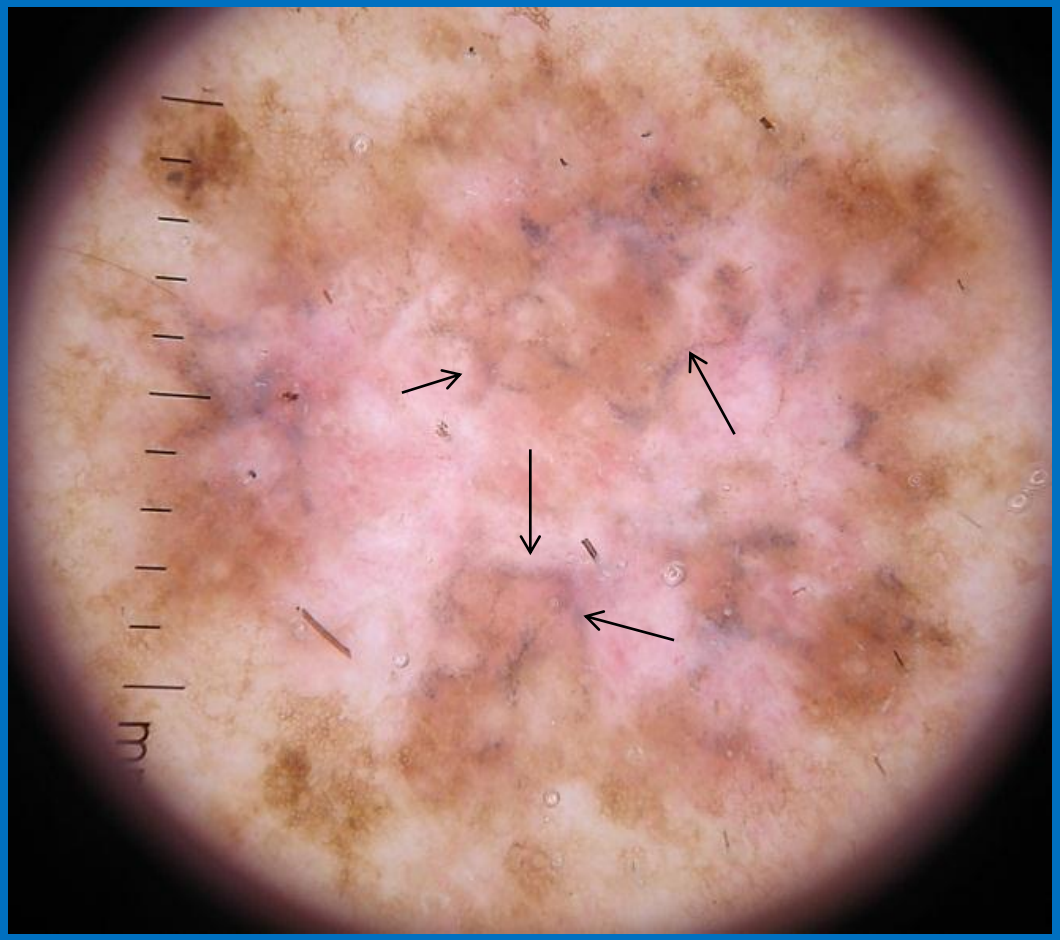
At least one of:-

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 (acral) or chaotic (nails)
9. **Polygons**

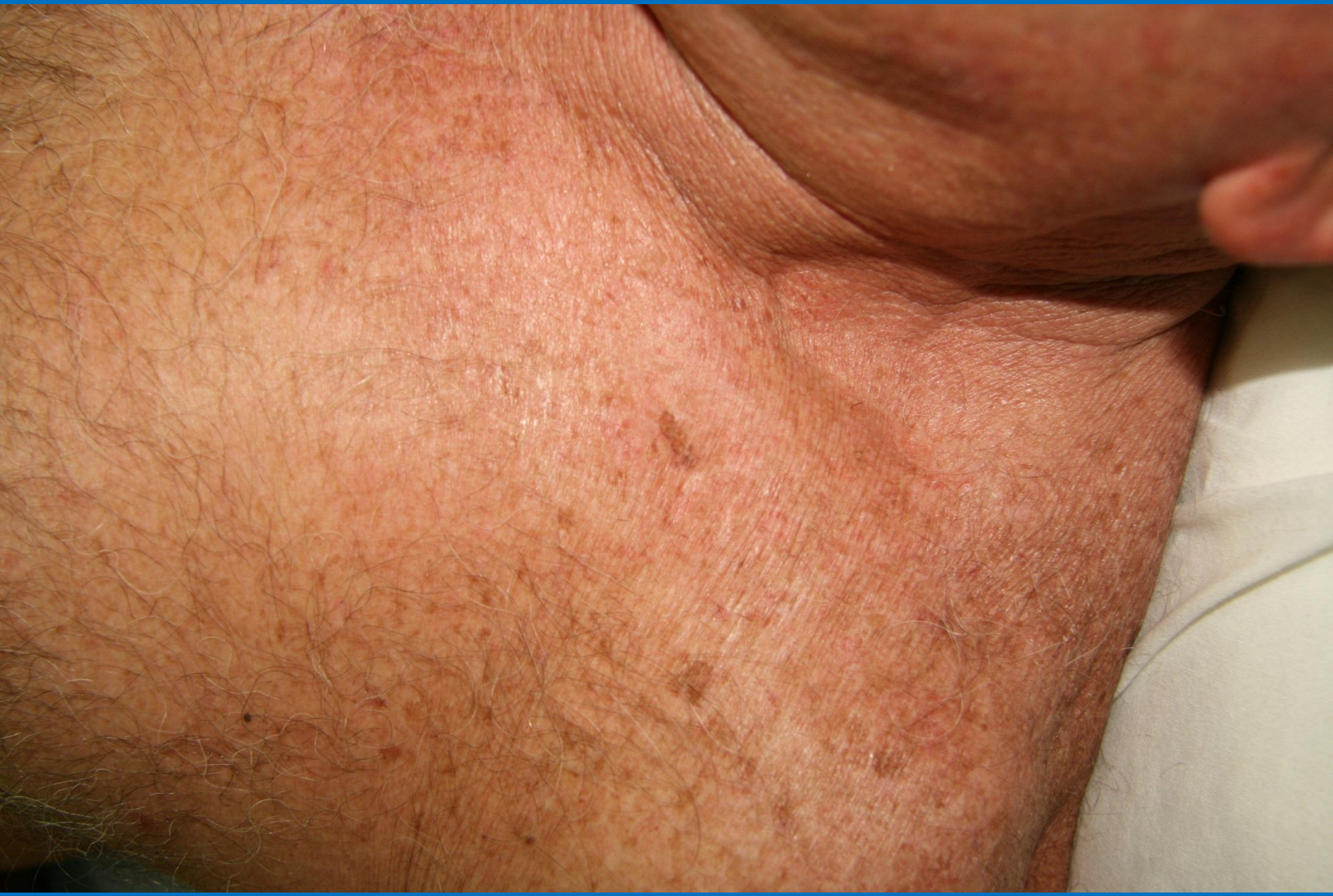
…modified by Jeff Keir

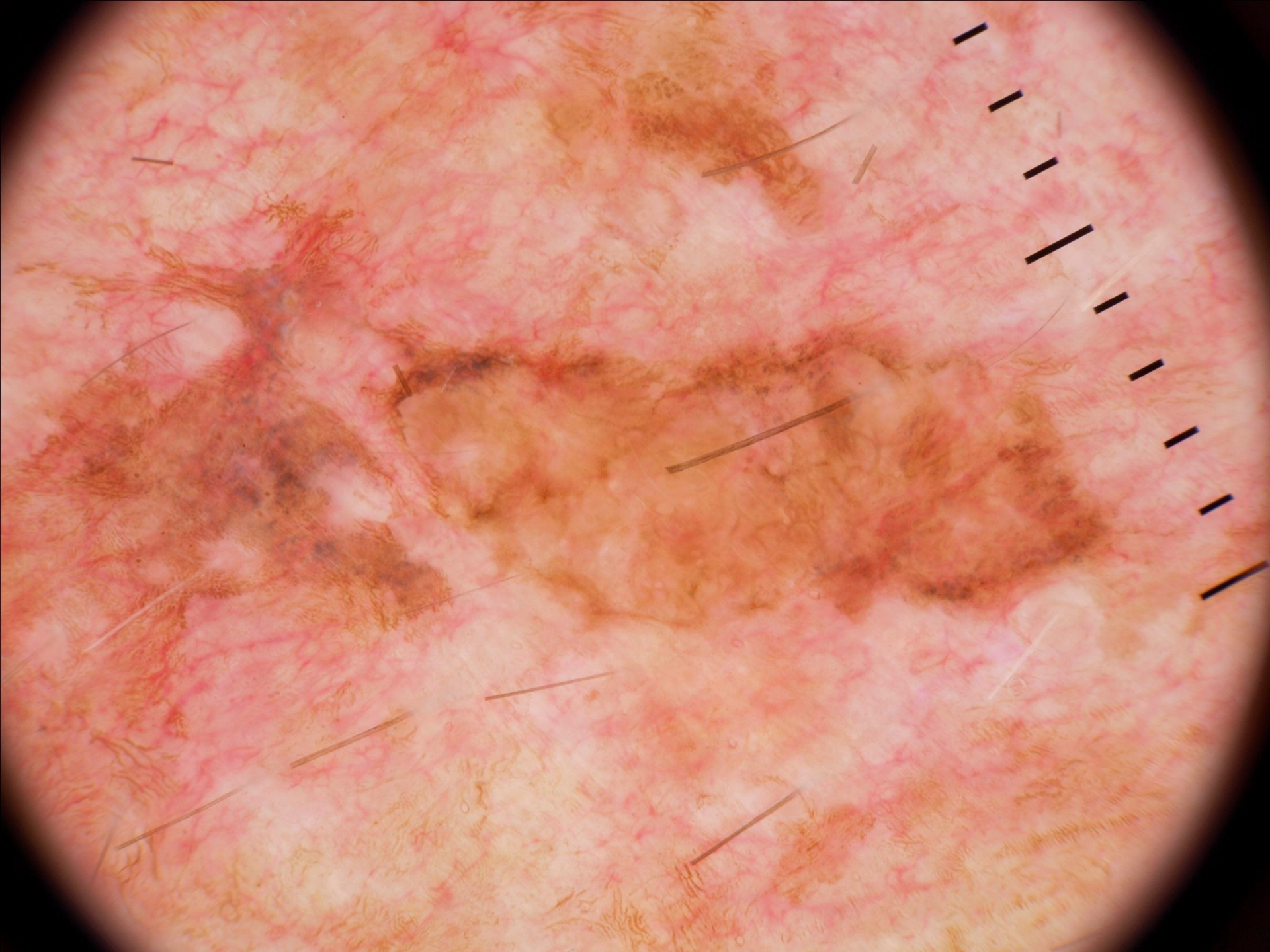
Jeff Keir was the first person to describe this structure. We have not included it in the eight clues because the clue of grey structures is usually also present with polygons. In my series of 260 melanomas polygons are present in over one in five (unpublished data).

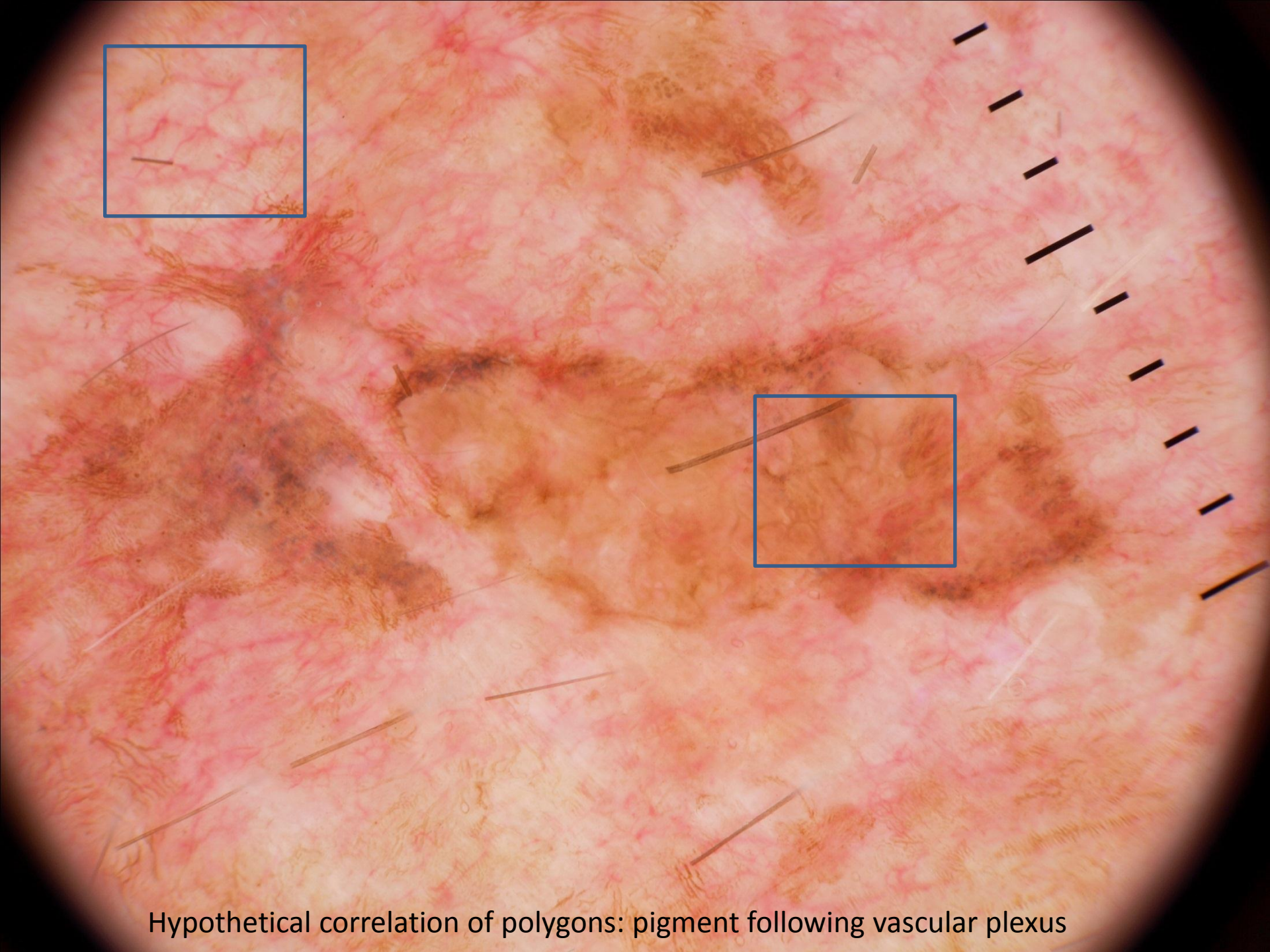
Polygons



A geometric polygonal shape complete or incomplete, bounded by straight lines, or by a straight pigment interface, meeting at angles and larger by far than the holes bounded by reticular lines



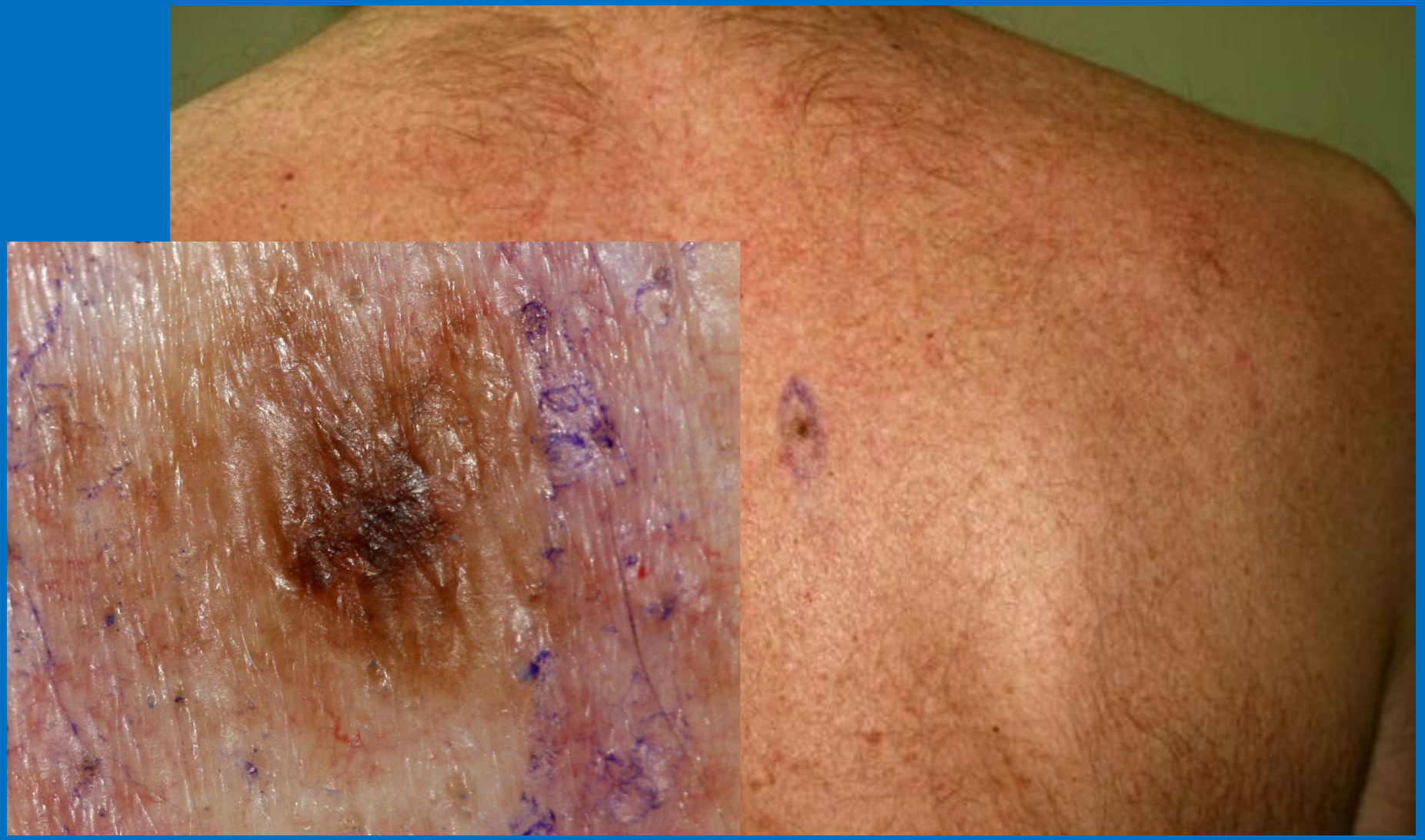




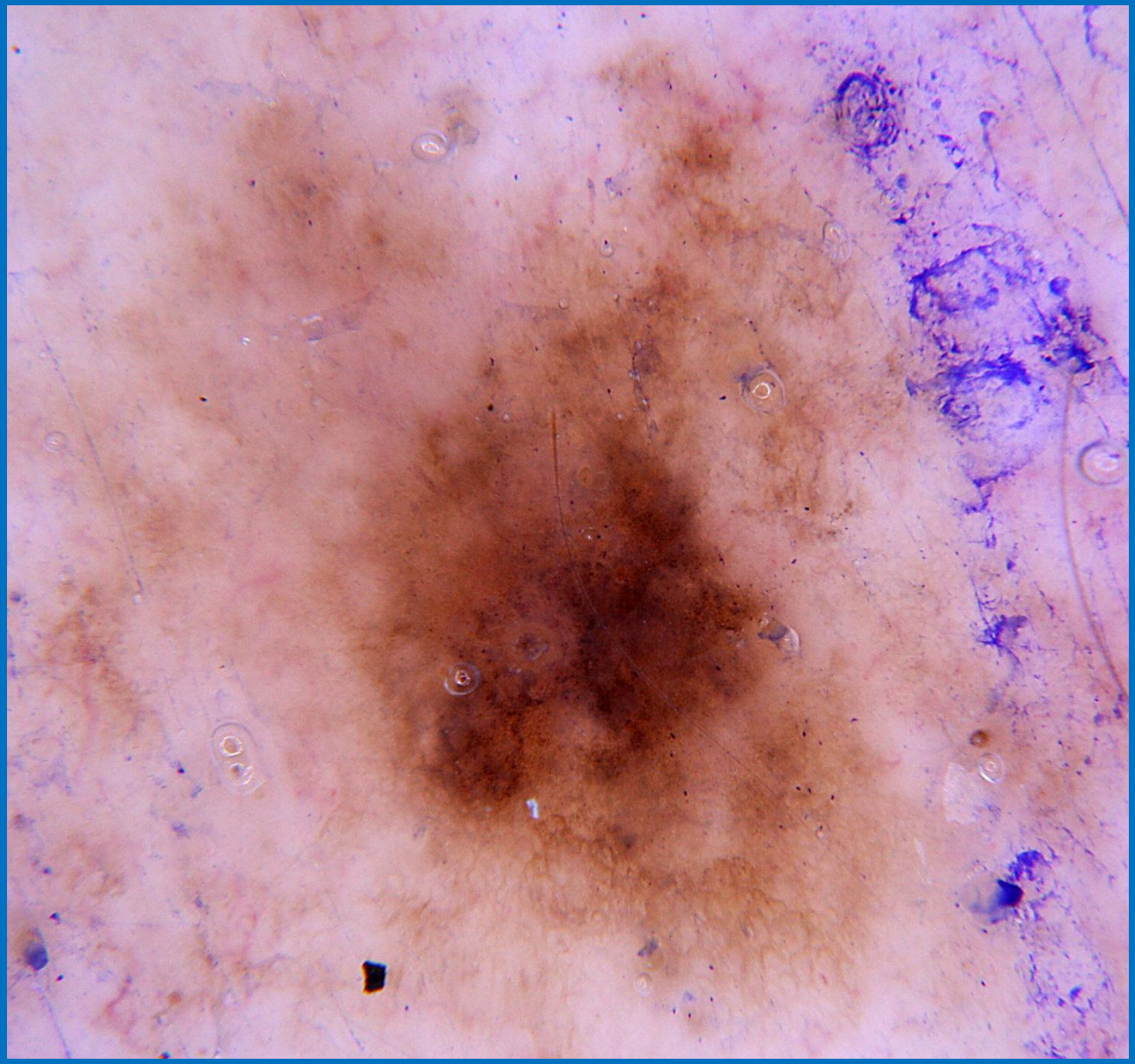
Hypothetical correlation of polygons: pigment following vascular plexus

A 47 year old patient with no past history of melanoma or skin cancer presented for a skin check in December **2011**.

The following images from **2007** were “discovered” in his file.



They had been taken for a colleague four years earlier, prior to his excision biopsy of this lesion but when the lesion was reported benign it was forgotten…



Examination of the dermatoscopic images revealed Chaos + Clue (grey dots) and with polygons which greatly increasing specificity for malignancy. Polygons had not been described in 2007!

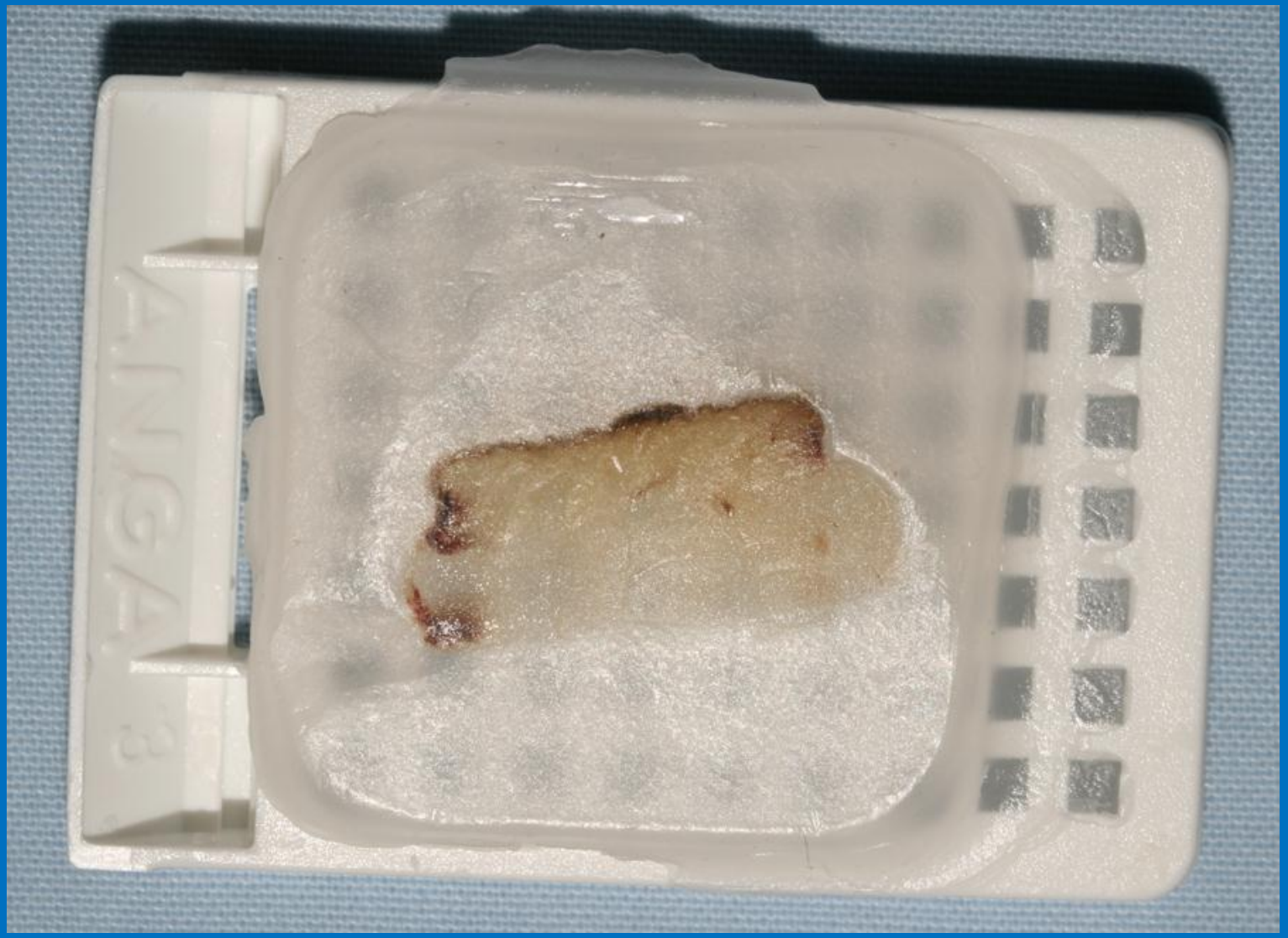
Signed our report in 2007:
Back: Sections show a lentiginous naevus of early compound type.
There is no atypia.
The excision appears complete.

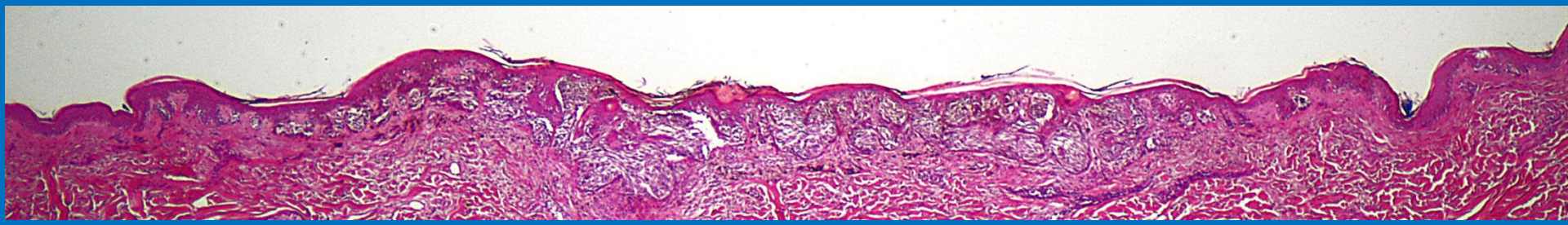
Sampling error was suspected

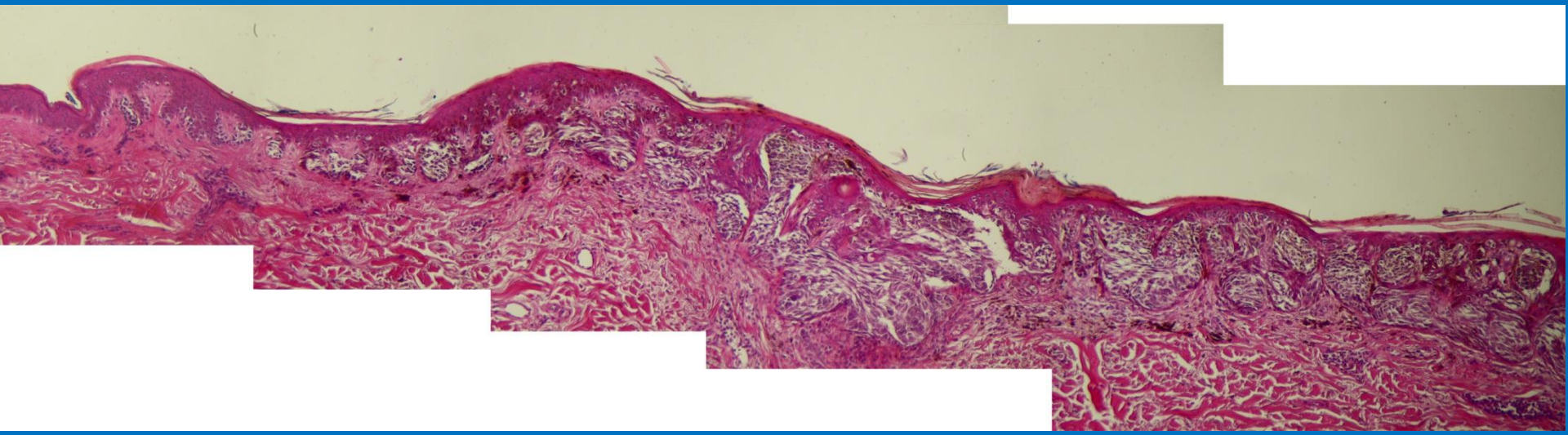
Slides were requested from the laboratory.

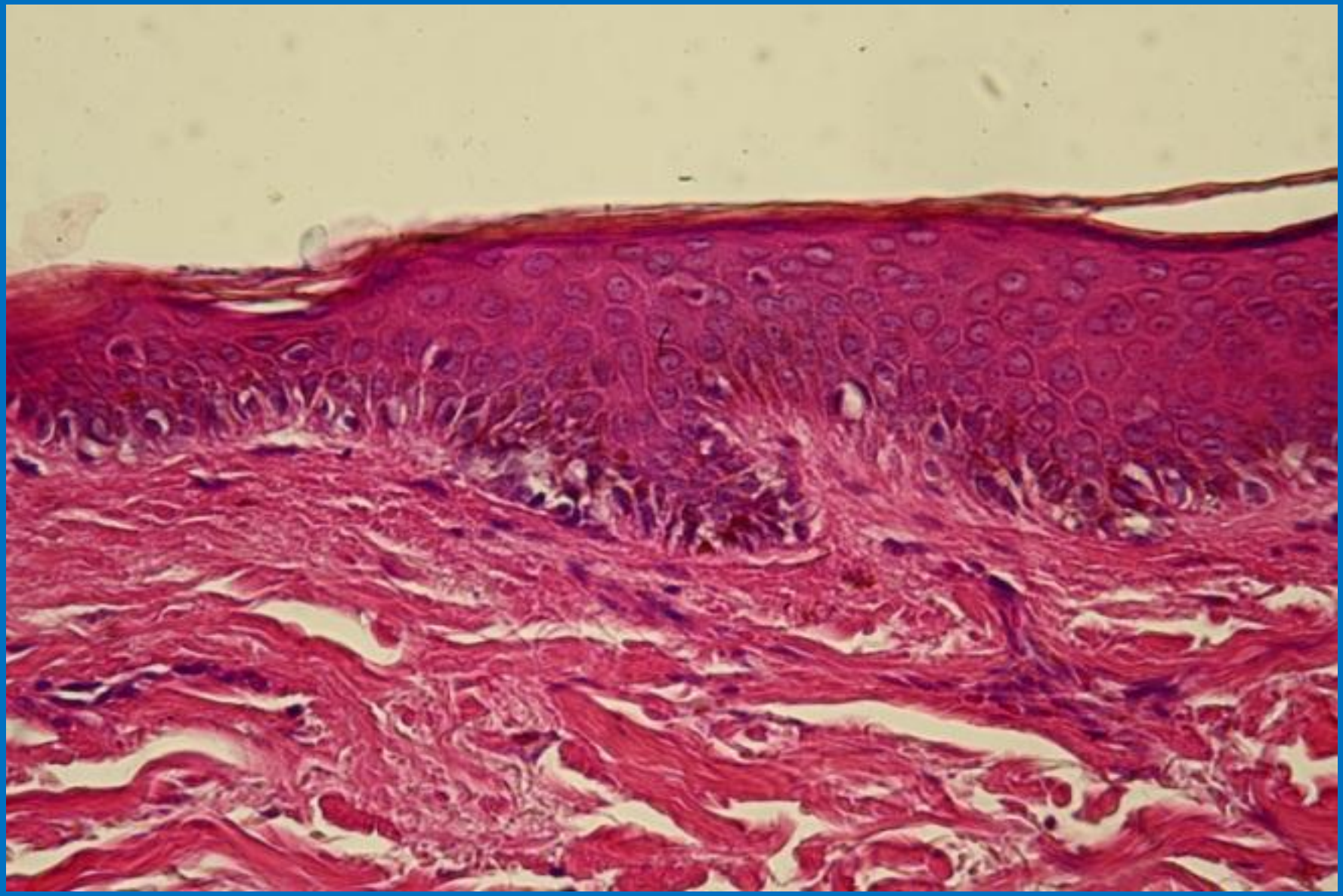
They had faded and were not useful.

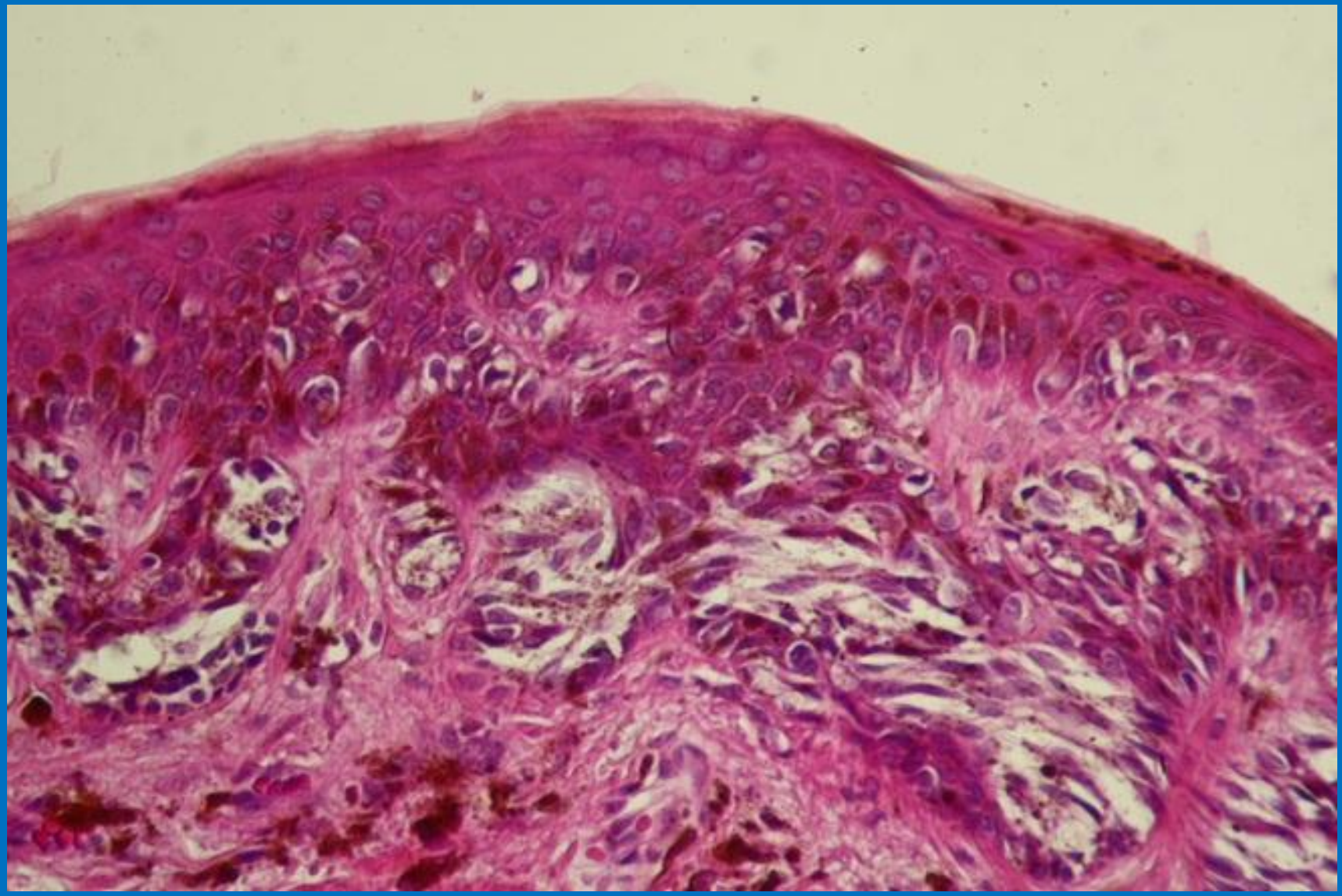
The pathologist offered to cut and stain new slides from the paraffin tissue block.

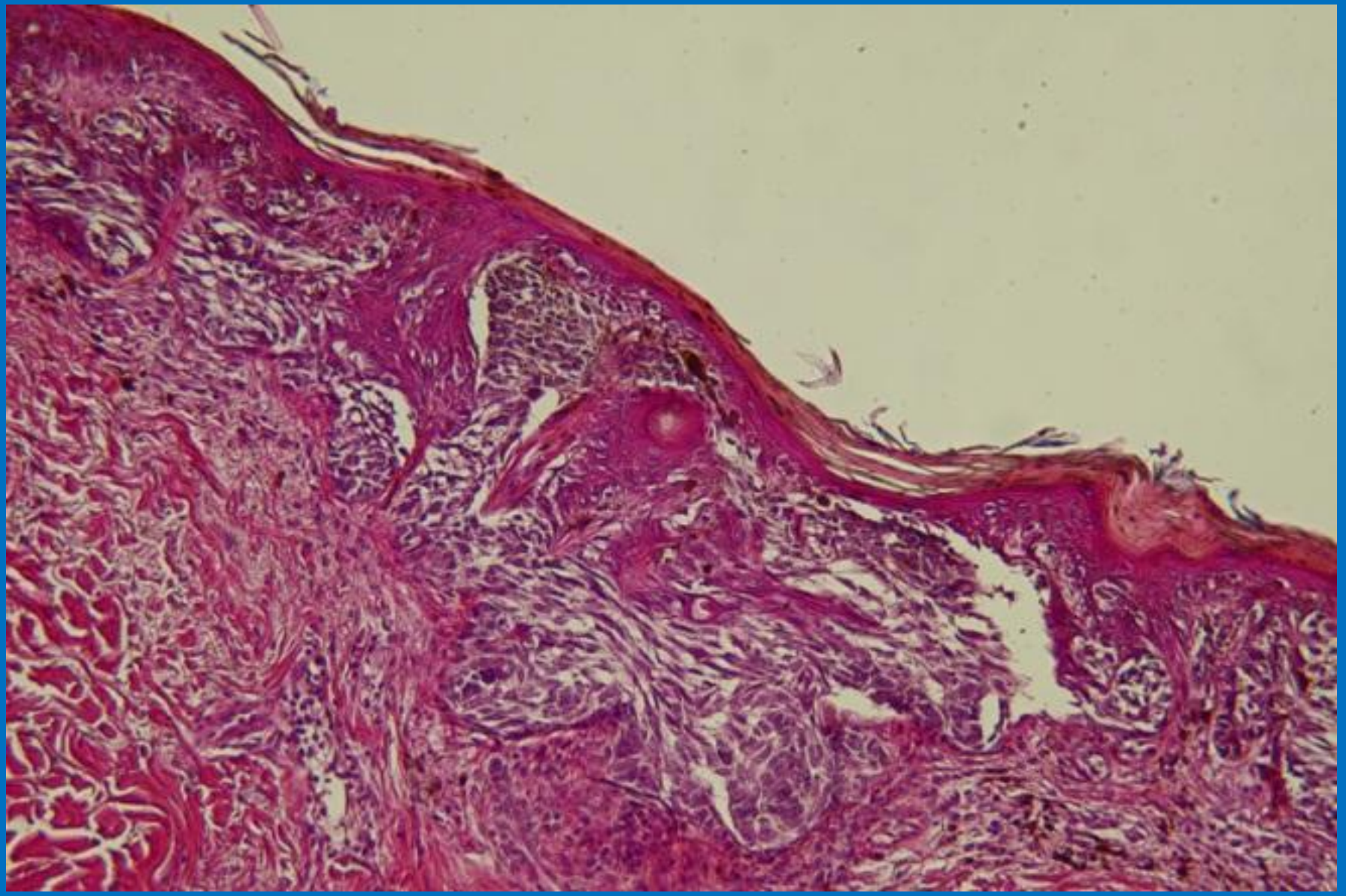


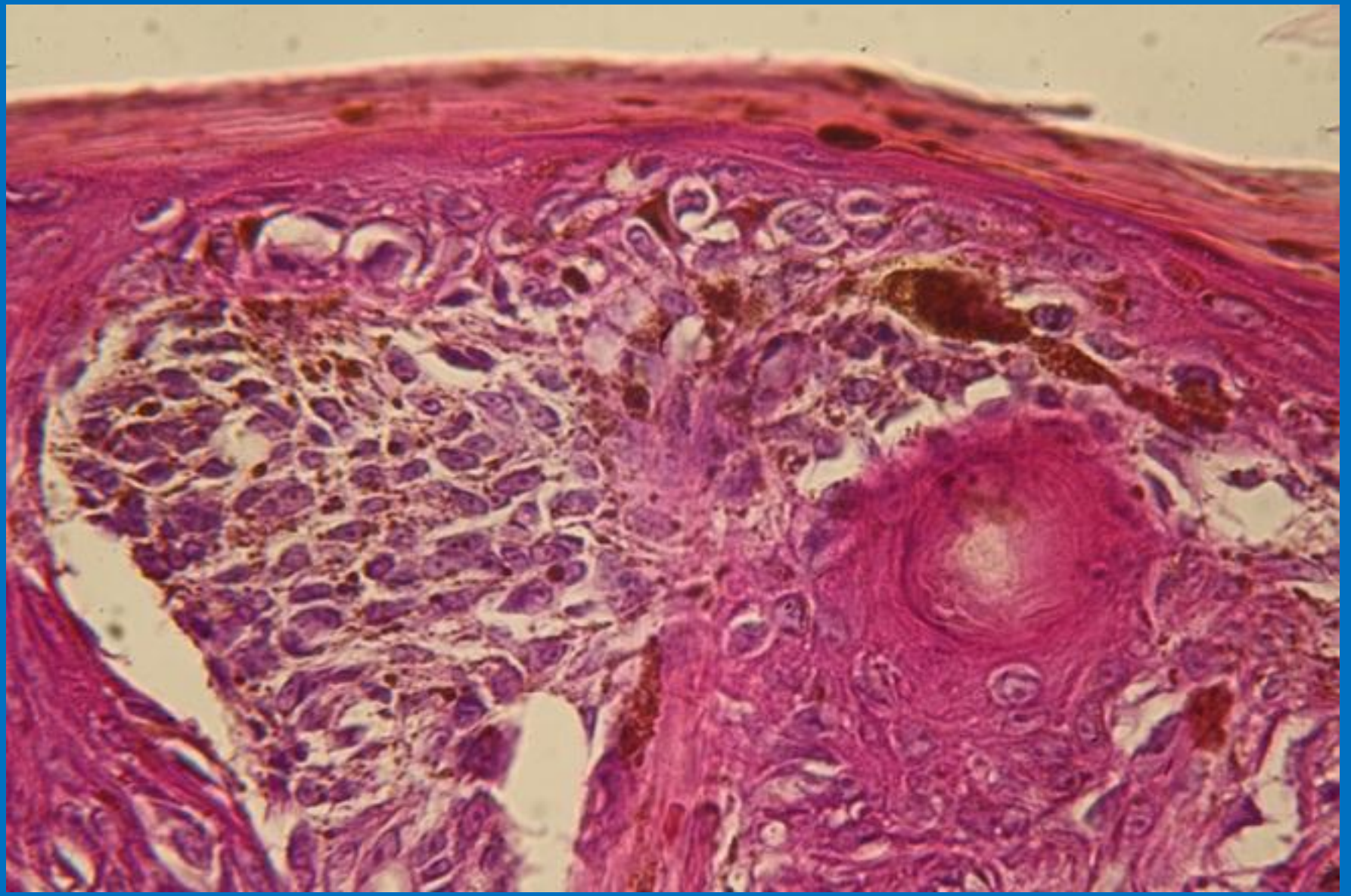


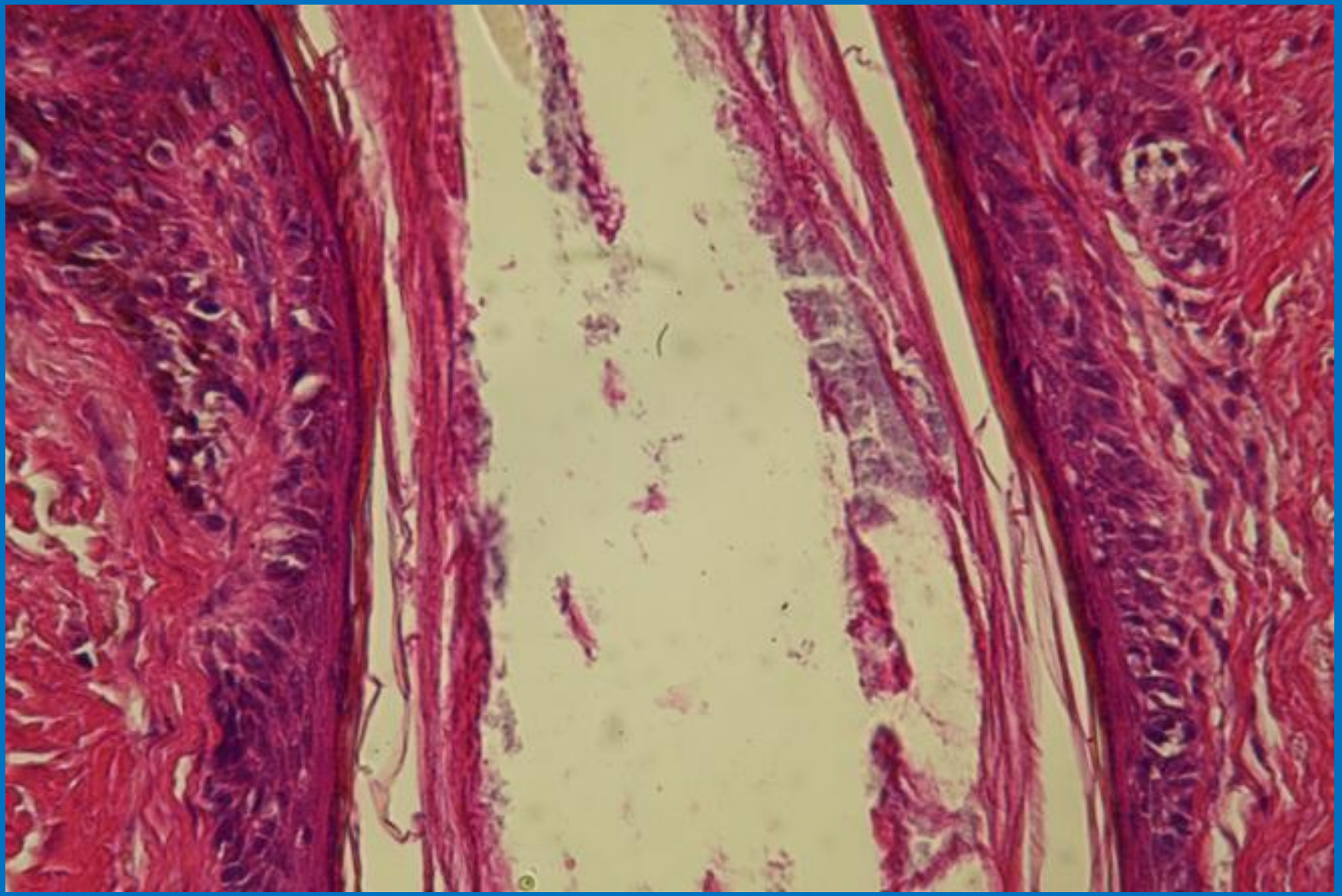


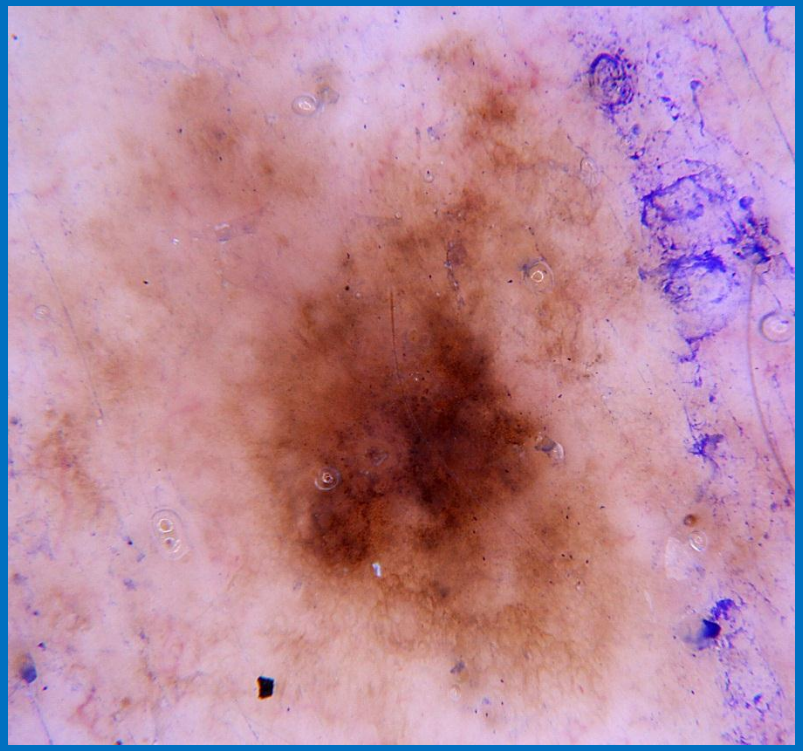








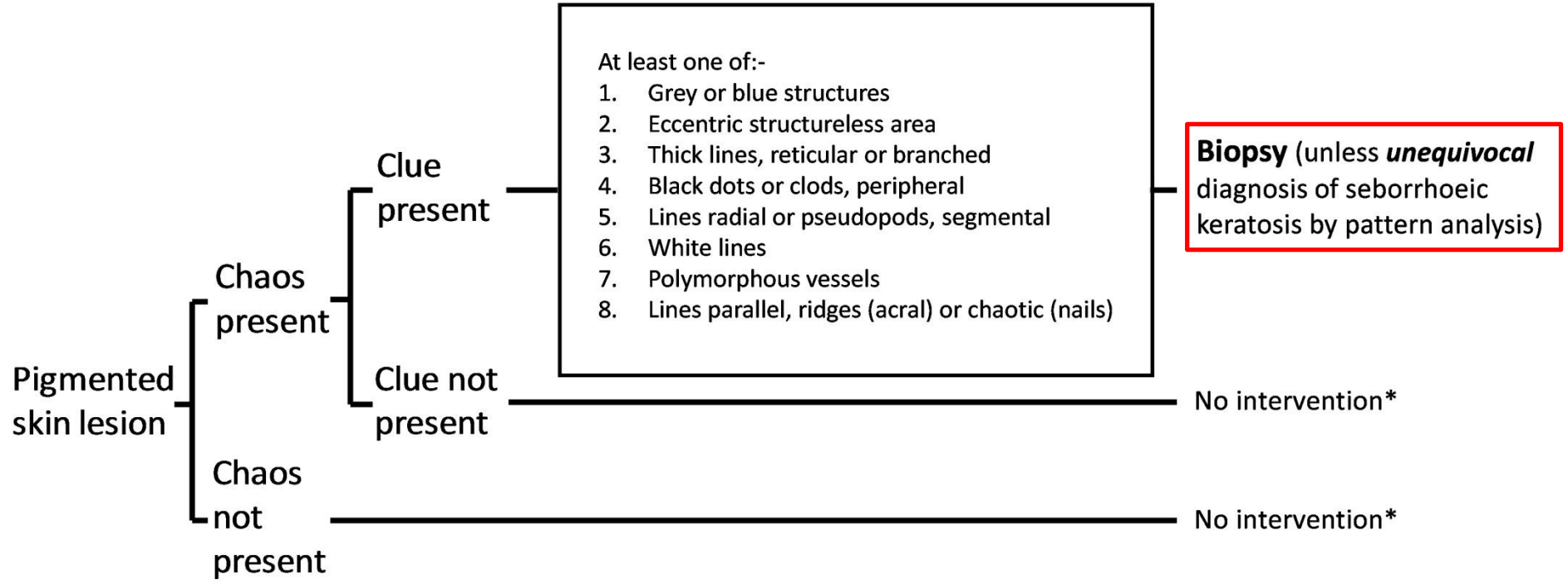


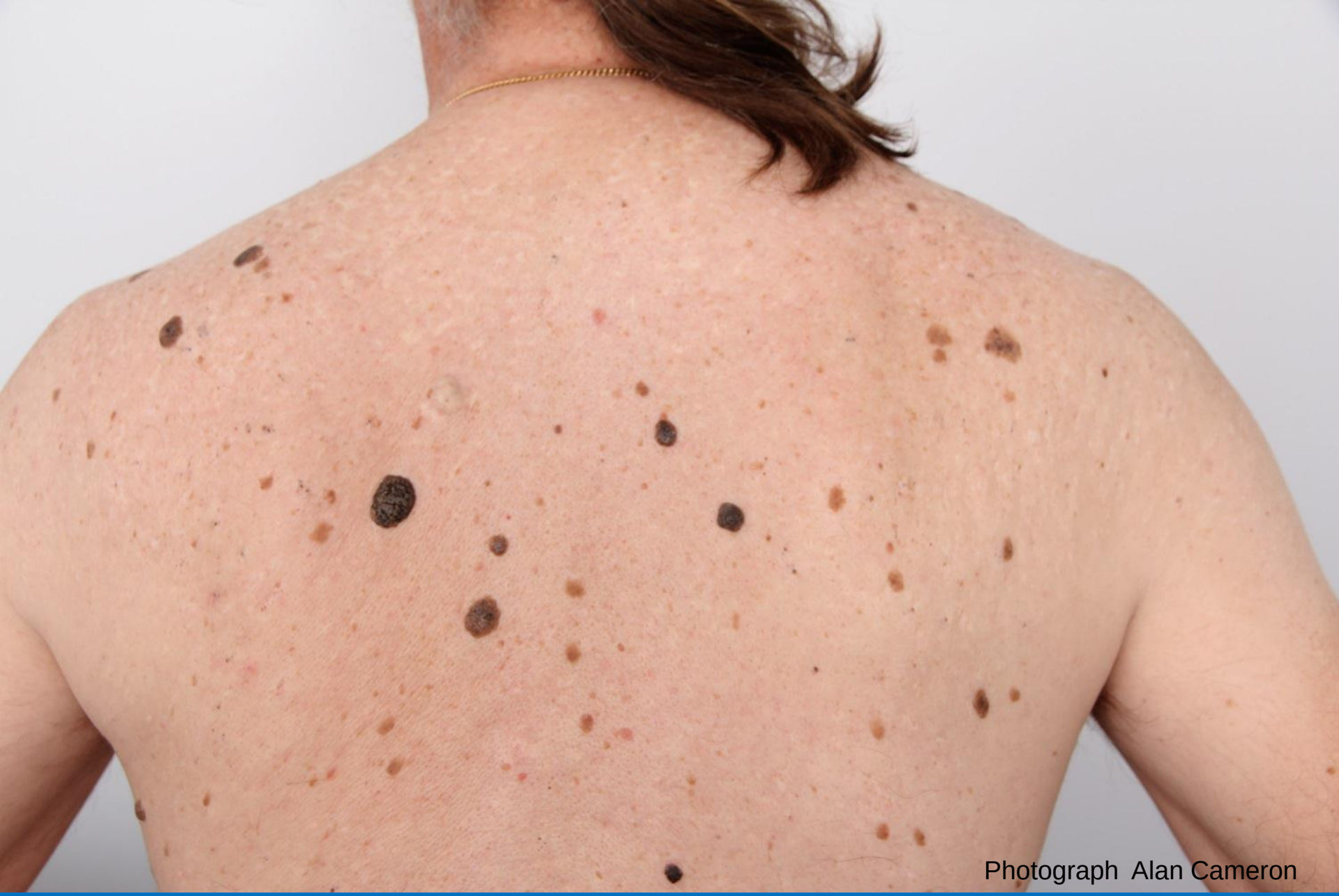


New report:
"…it looks like a level 1 superficial spreading **melanoma** now."

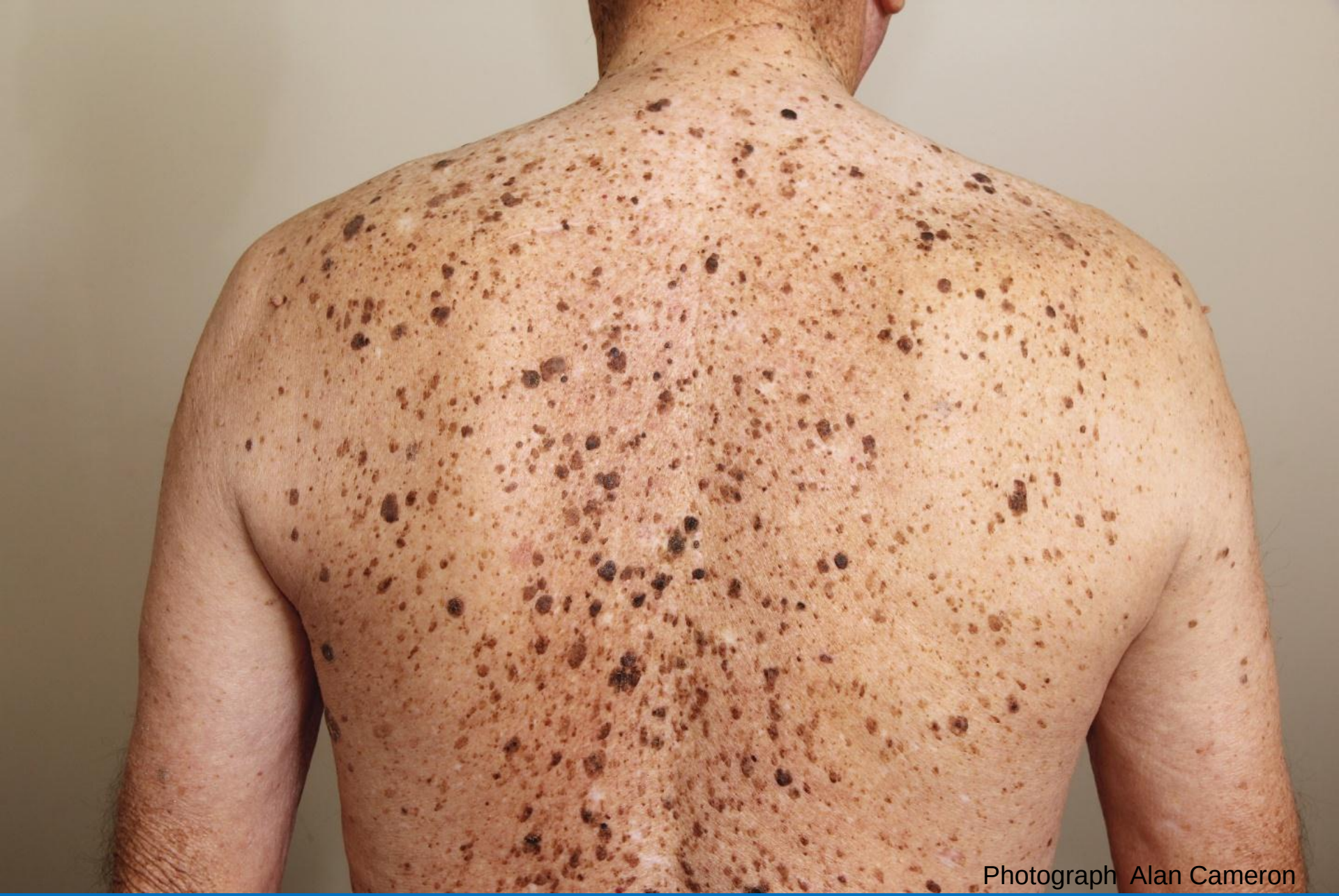
In this case review was requested four years later because it was discovered that the dermatopathology report did not correlate with the dermatoscopic image.
It helps to have photos and to talk to your dermatopathologist!

Excluding seborrhoeic keratosis





Usually seborrhoeic keratoses can be diagnosed with confidence clinically



It may be impractical to examine every single one with a dermatoscope. Caution is necessary because melanomas can be concealed among seb K and seb K can be colonised by melanoma.

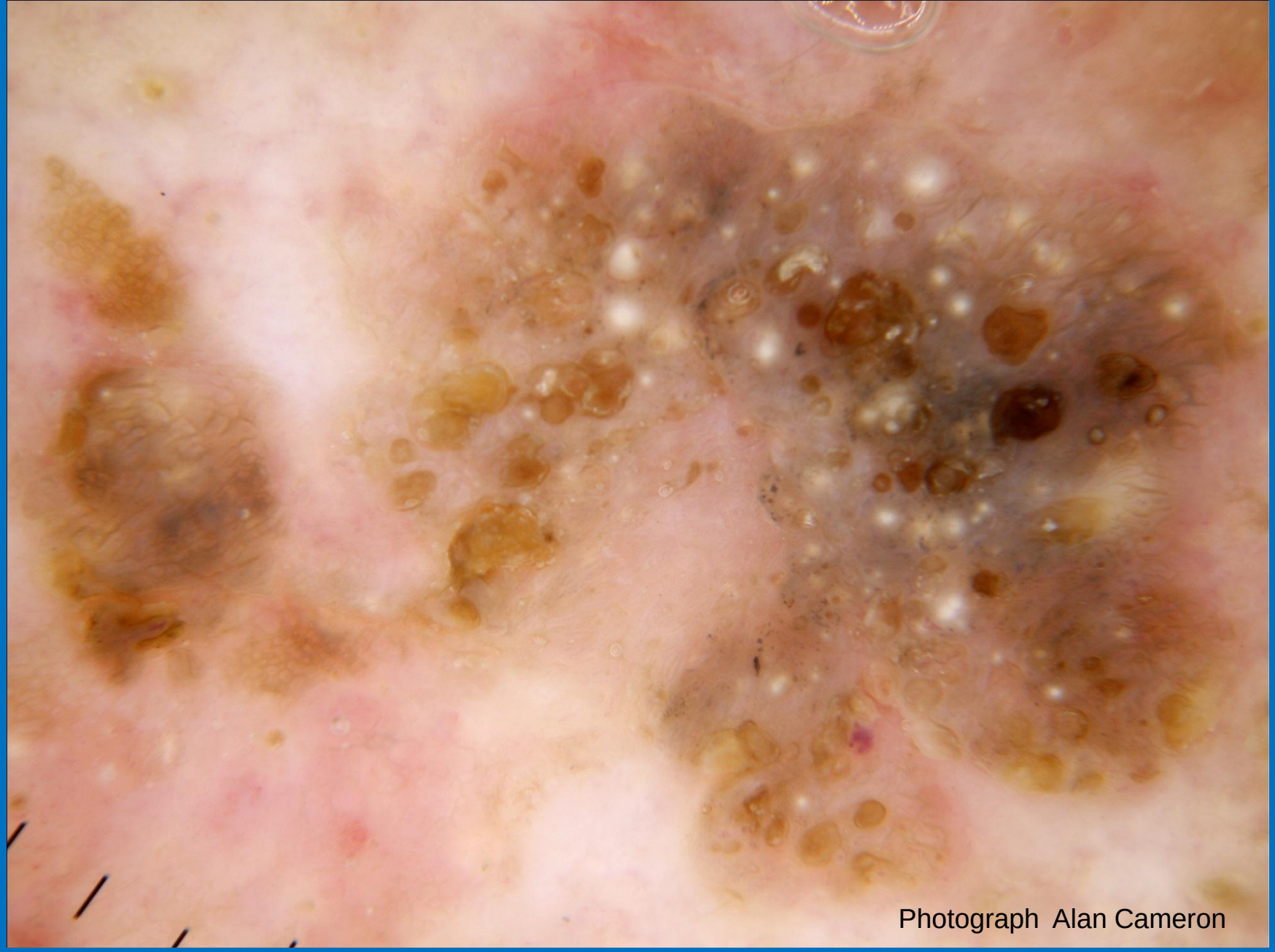
Excluding seborrhoeic keratoses

- **Multiple orange or yellow clods**
- **Multiple white clods**
- **Thick curved lines**
- **Well demarcated border over total periphery**
- **Multiple grouped similar lesions**

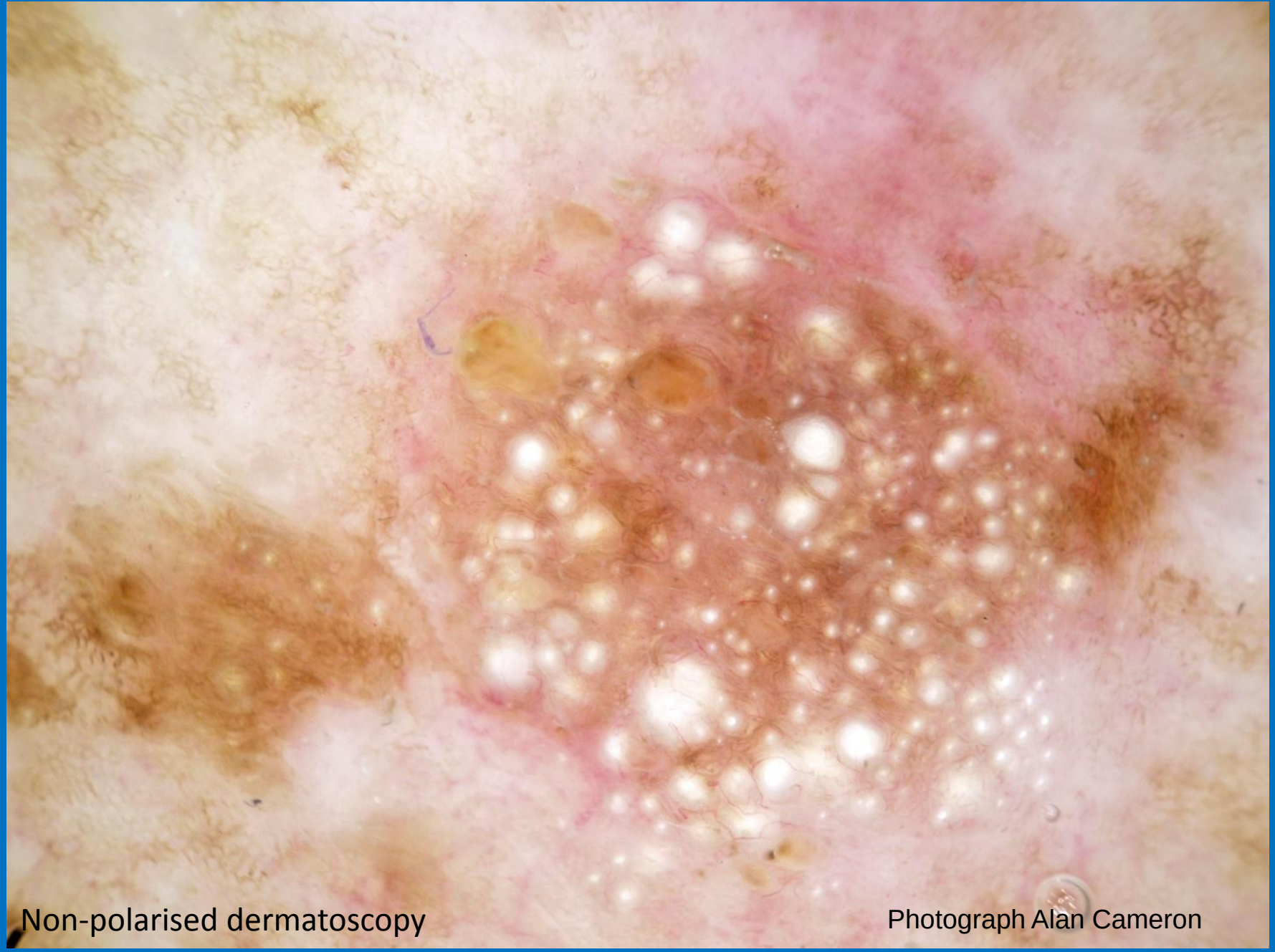
Malignant conditions can have individual criteria

Weigh the clues to arrive at a diagnosis

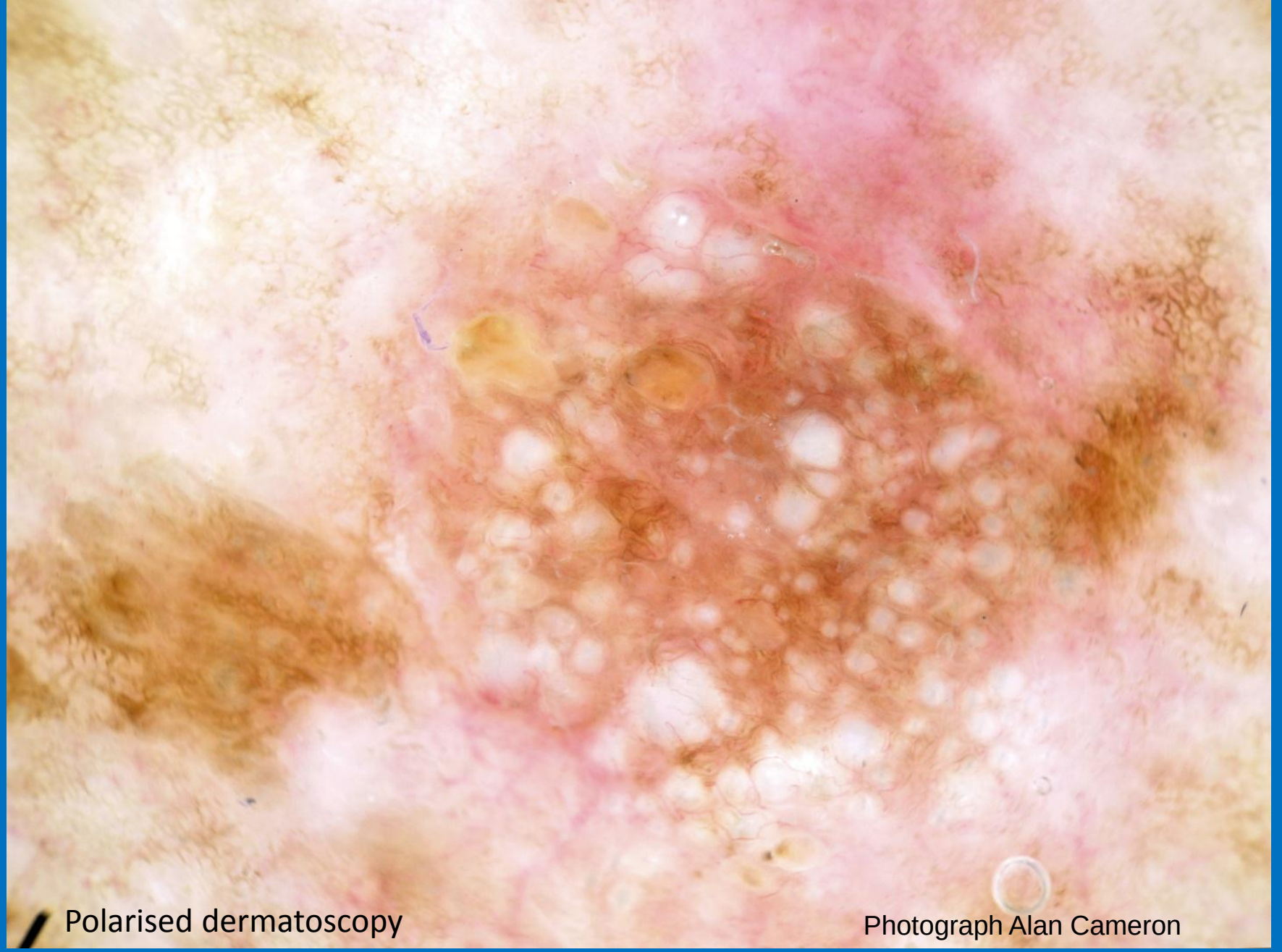
If in doubt at all - BIOPSY



Multiple orange and white clods in a seborrhoeic keratosis



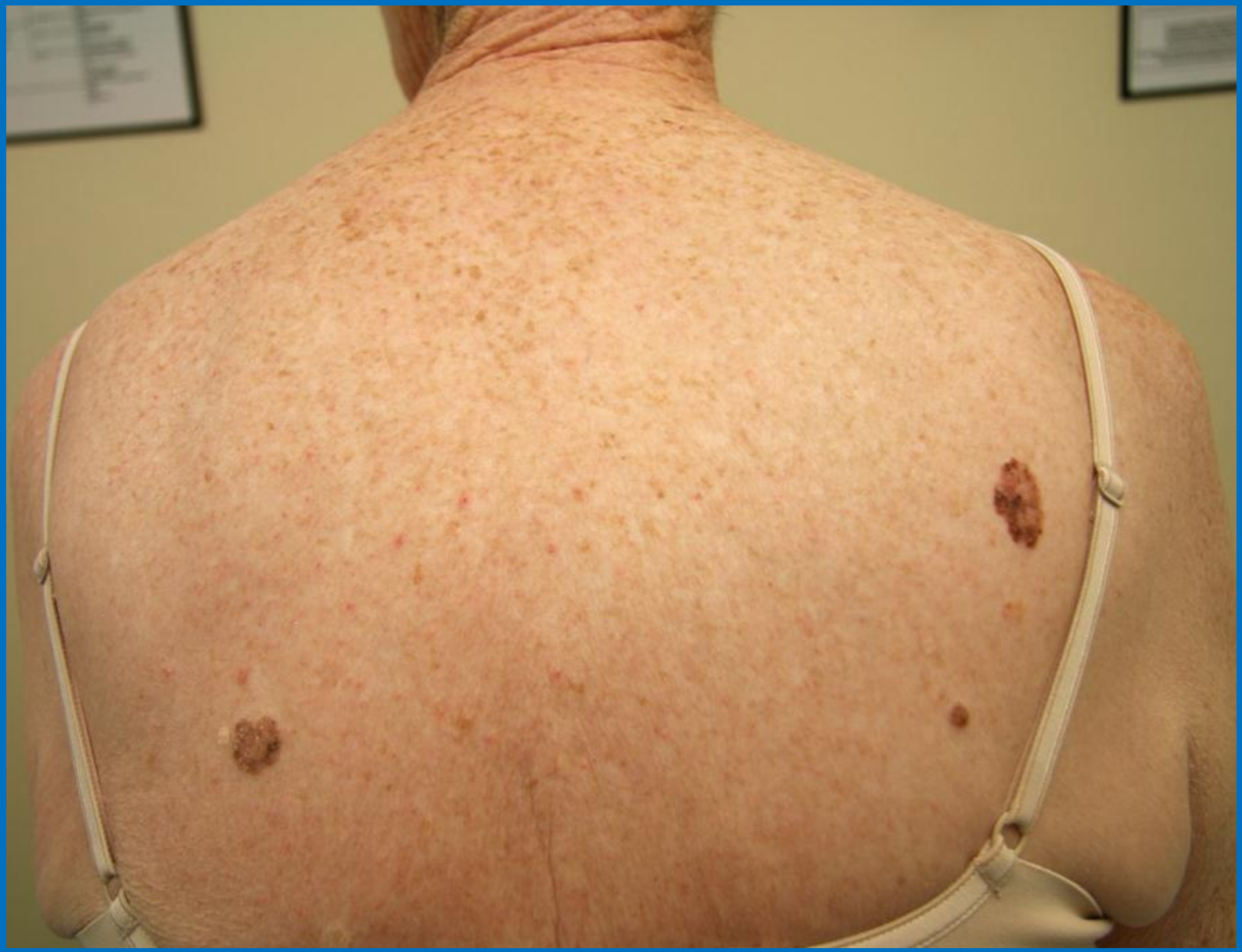
White clods are much more evident with non-polarised dermatoscopy



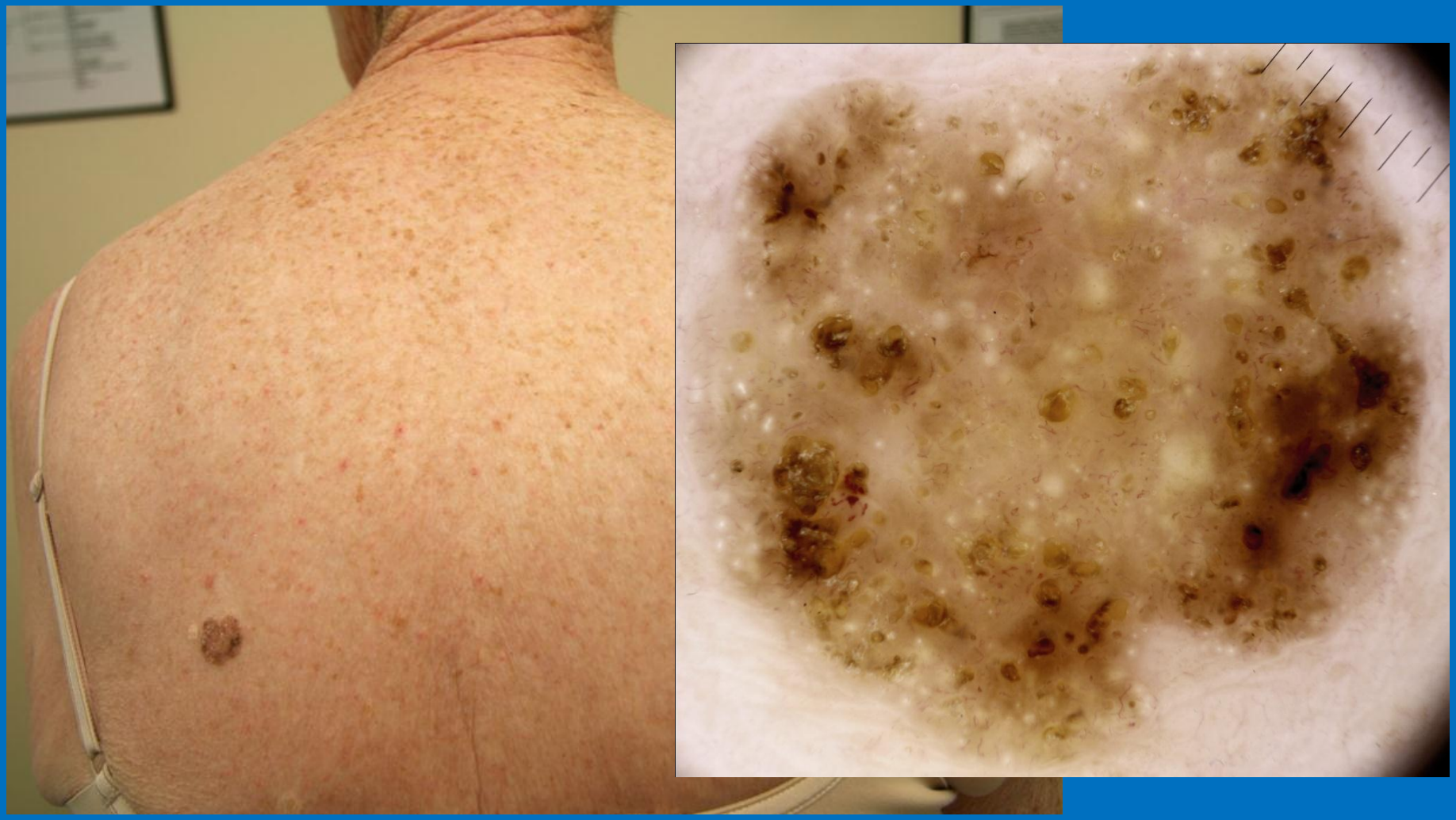
Polarised dermatoscopy

Photograph Alan Cameron

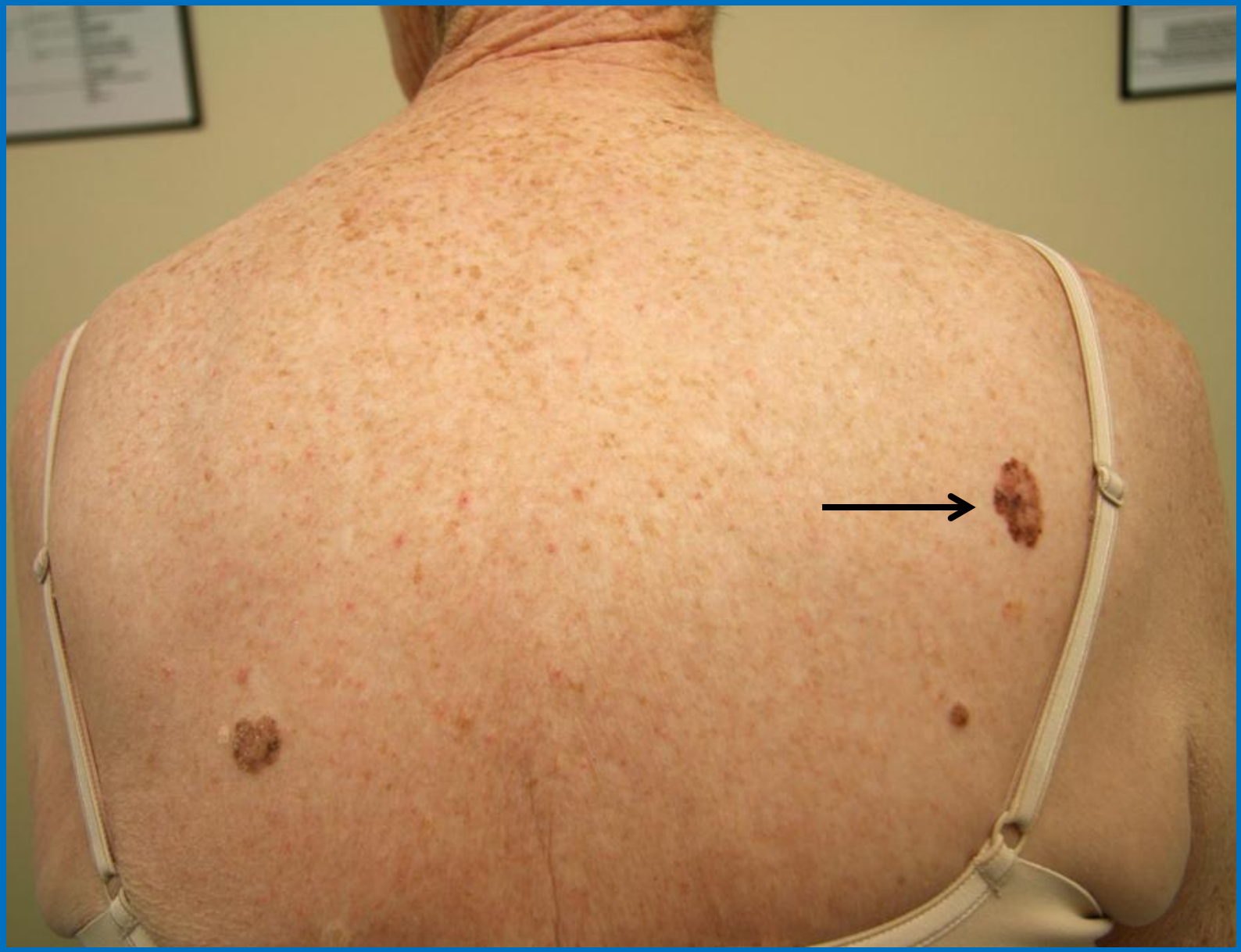
Thick curved lines

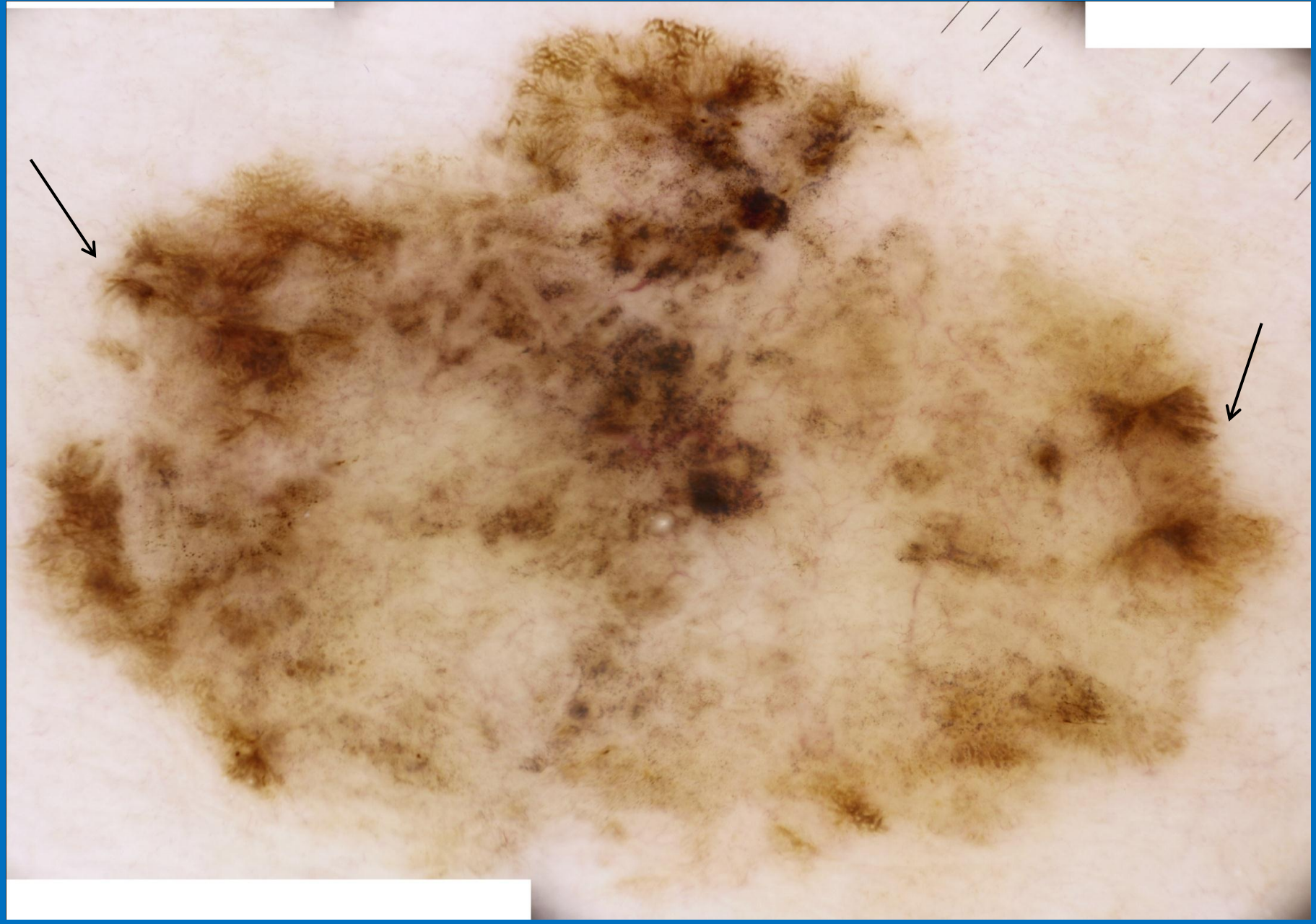


This patient had been told at her annual physical examination for seven years that both of these lesions were seborrhoeic keratoses. The one on the left was rough and the one on the right was silky smooth.



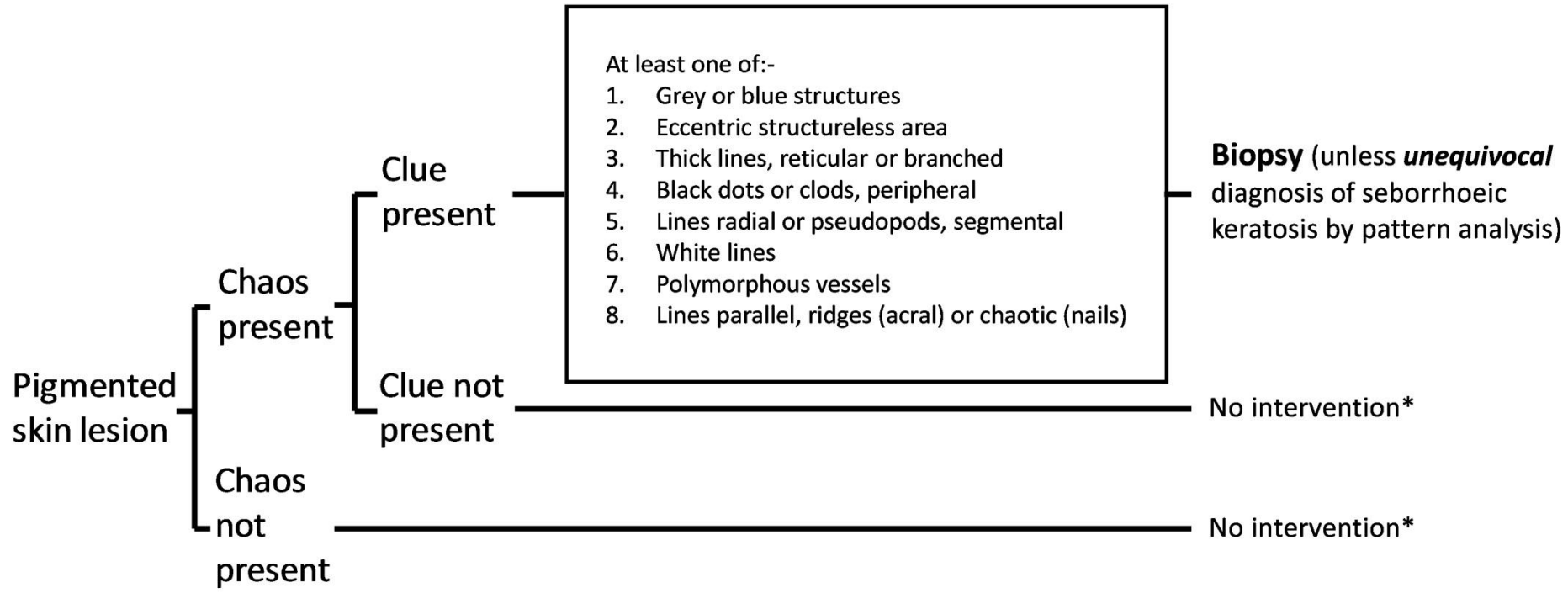
The lesion on the left had multiple clues to seborrhoeic keratosis (multiple orange and white clods and a sharply demarcated border over the total periphery, so although it was chaotic with the clue of peripheral black clods, seborrhoeic keratosis was diagnosed unequivocally and it has not been excised.





The lesion on the right has Chaos + Clues (grey dots and lines radial segmental) and not a single dermatoscopic clue to seborrhoeic keratosis. It was an invasive melanoma (Breslow 0.55mm).

Exceptions



* Exceptions to "No intervention"

1. Changing lesions on adults
2. Nodular or small lesions with any clue
2. Dermatoscopic grey on head or neck
4. Parallel ridge pattern (palms or soles)

Exceptions

Exceptions are an untested part of the algorithm aimed at increasing sensitivity from the verified 90.6%[6]. We suggest that lesions with the features listed here be further assessed with careful weighing of all clinical and dermatoscopic clues *even if not chaotic*.

1. Changing lesions on adults, especially with increasing age, with either historic or dermatoscopic evidence of change (peripheral clods, radial lines or pseudopods).

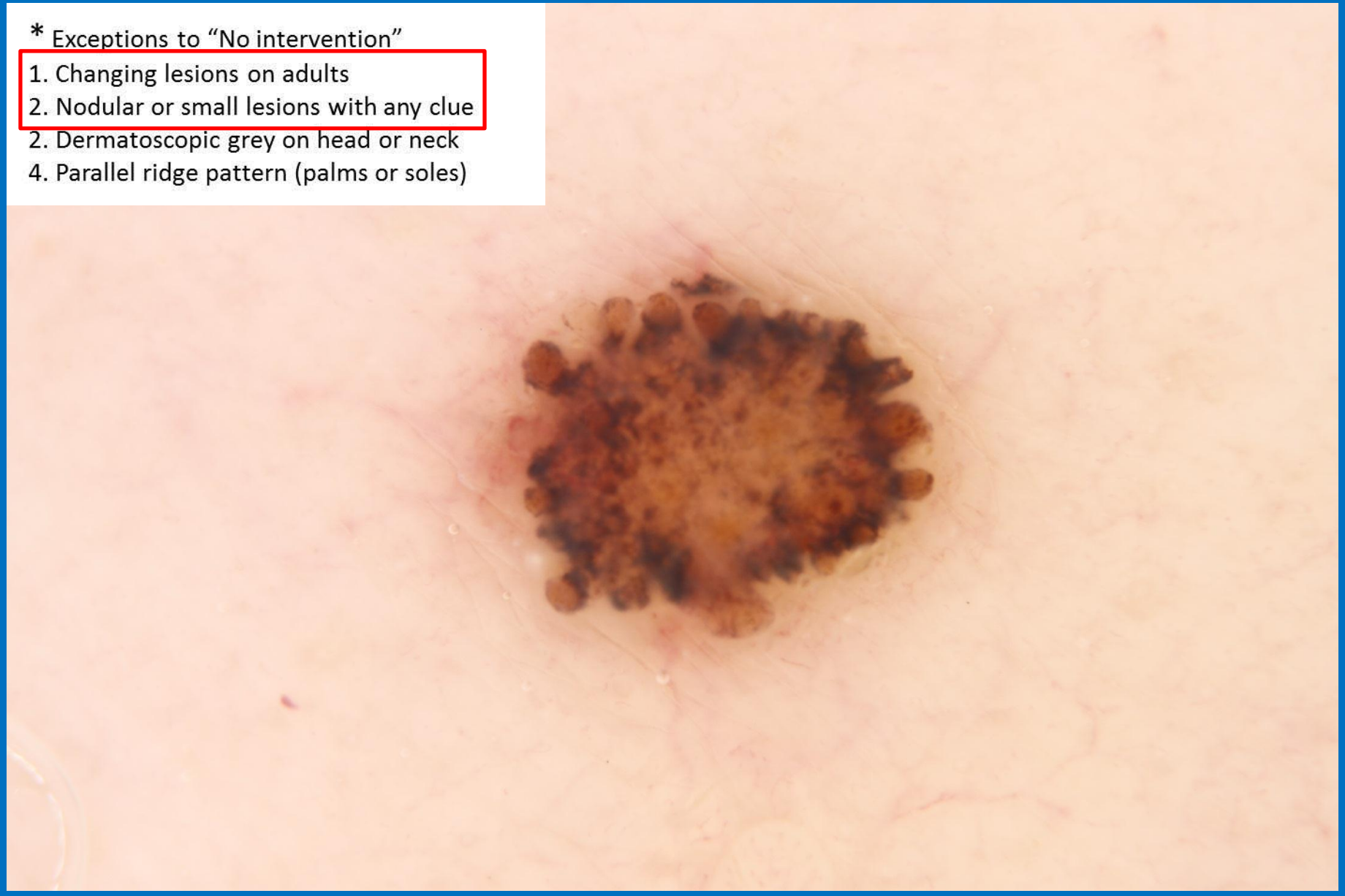
2. Nodular lesions or very small lesions with any clue to malignancy.

3. Any lesion on the head or neck with dermatoscopic grey colour.

4. Lesions on palms or soles (acral) with a parallel ridge pattern.

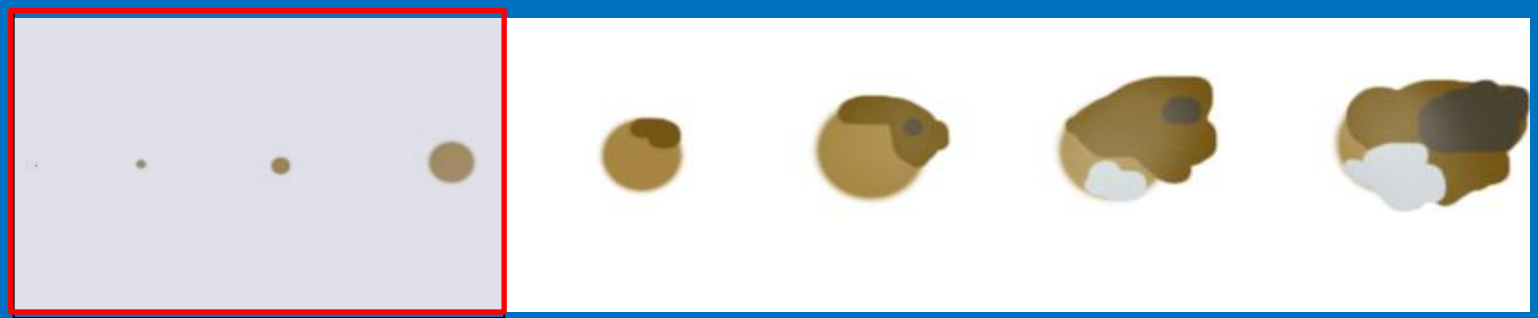
* Exceptions to “No intervention”
1. Changing lesions on adults
2. Nodular or small lesions with any clue
2. Dermatoscopic grey on head or neck
4. Parallel ridge pattern (palms or soles)

This lesion was discovered by the doctor when the patient presented with another problem. He had to retract her bra-strap to discover it. Clinically although minute, it “broke the pattern”.



Although arguably **symmetrical**, this 4mm diameter lesion was a **small nodular** lesion with a **clue to malignancy** (grey structures). The presence of peripheral clods signifies a growing lesion and was convincing evidence of **change**. **Nodular melanoma** (Breslow 0.9mm) [25]

Melanoma Timeline



How can we detect melanomas early on the melanoma timeline before they have dermatoscopic features of melanoma?

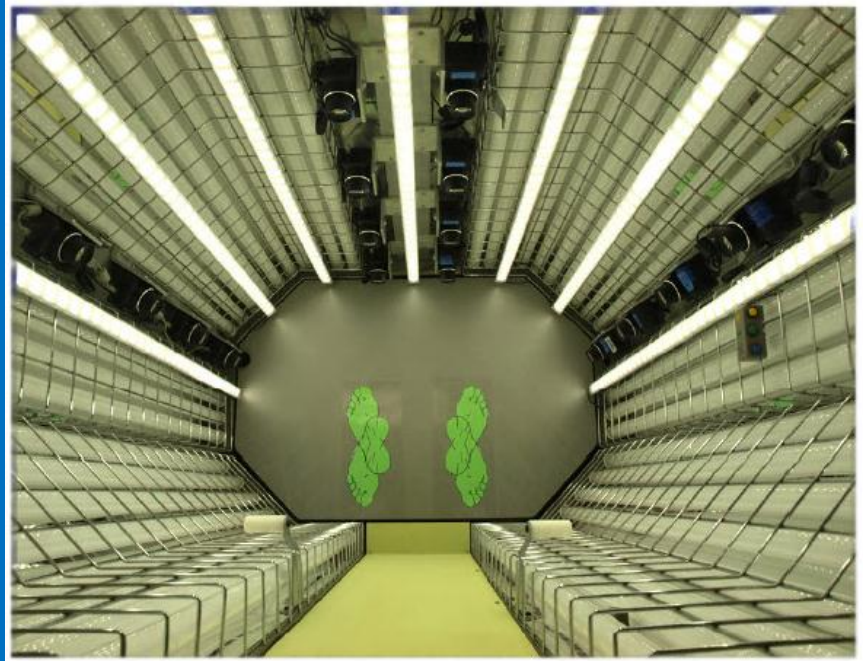
Dermatology Online Journal
Volume 16 Number 8
August 2010

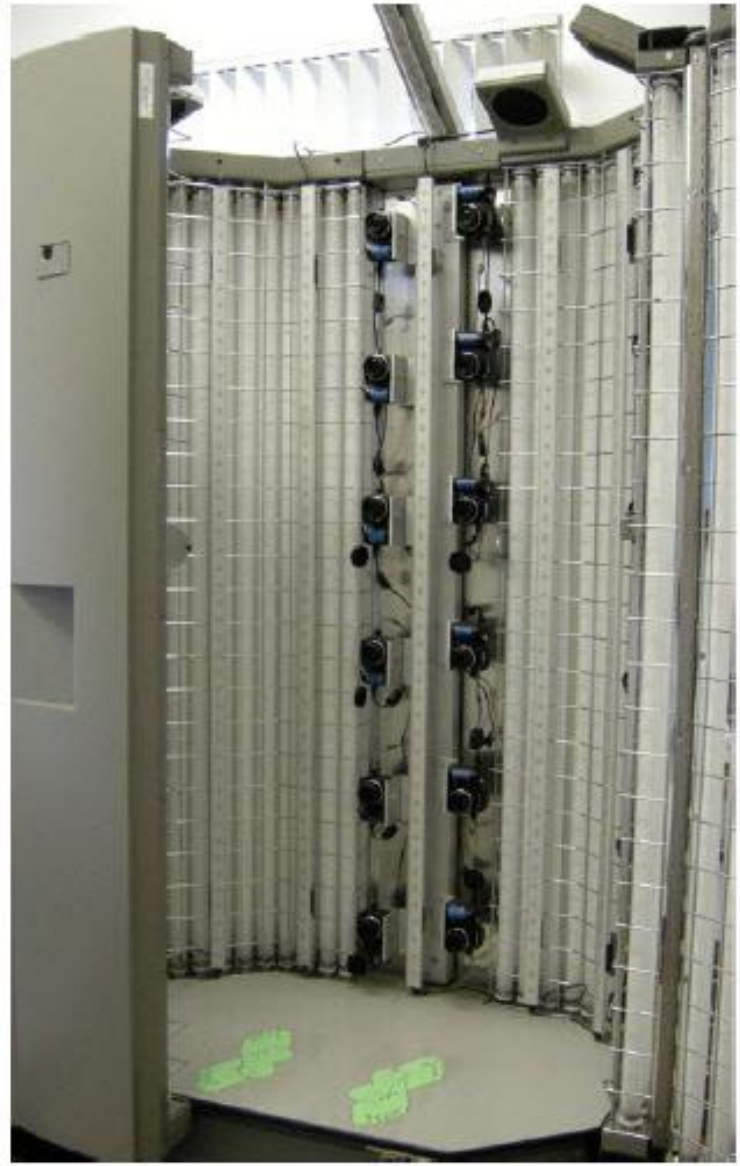
Clinical Pathway for Melanoma Detection Using Comprehensive Cutaneous Analysis with Melanoscan®

Rhett J. Drugge MD, Chi Nguyen, Luciana Gliga, and Elizabeth D. Drugge PhD
Dermatology Imaging Center; Stamford, Connecticut

ABSTRACT

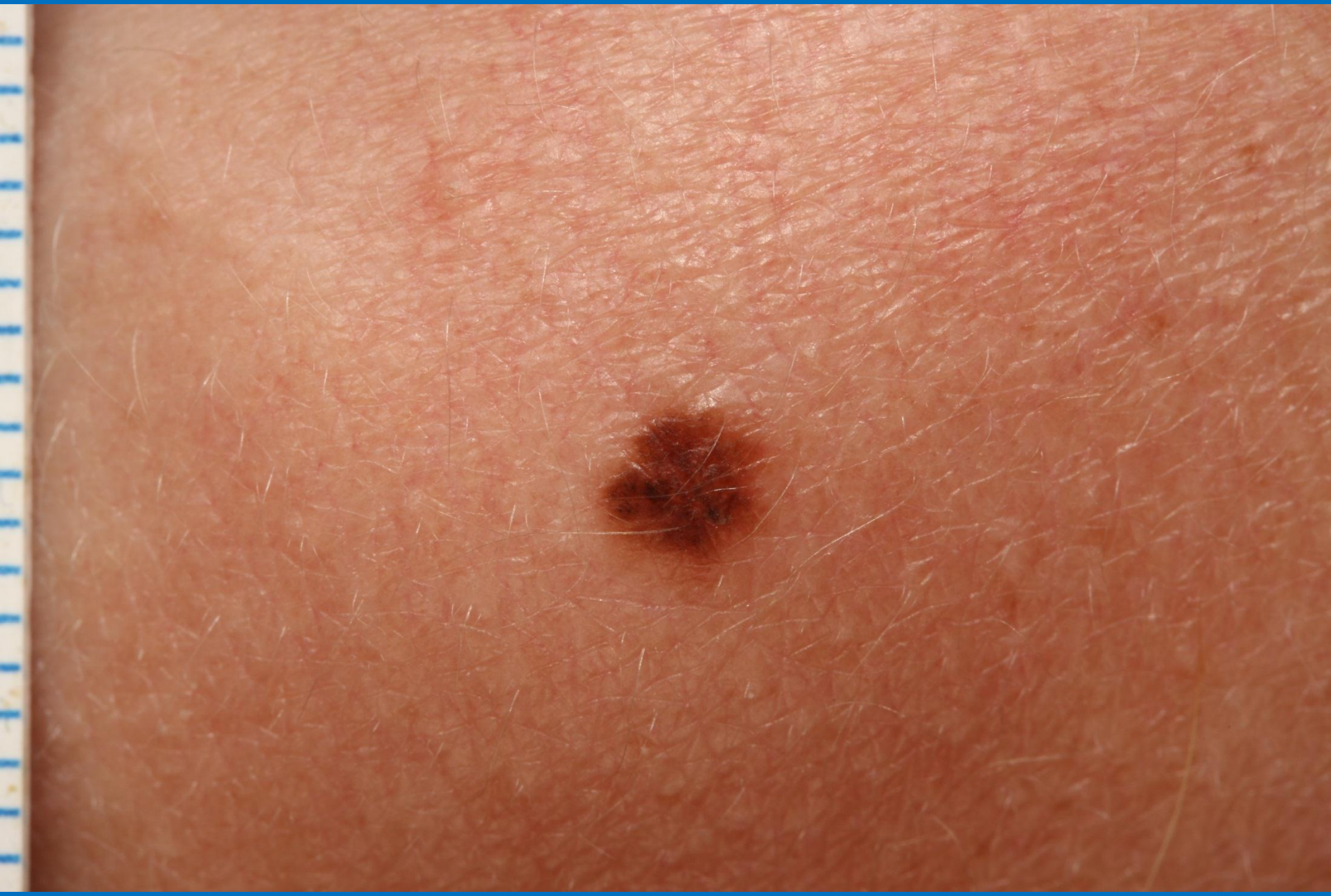
The usefulness of a comprehensive cutaneous photography system (Melanoscan®) was tested using the following parameters: 1) decision to screen pathway; 2) clinical pathway; 3) clinical outcome; and 4) patient acceptance. The results indicate that 55% of those with the key benefit of lowered Breslow depth (6). However, in spite of the preponderance of evidence for clinical photography (7, 8, 9, 10), dermatology has been hampered by a lack of access to high quality, reproducible clinical photography possibly because of earlier methods. Previous whole body photography methods for melanoma screening potentially add to physician examination time (11, 12).

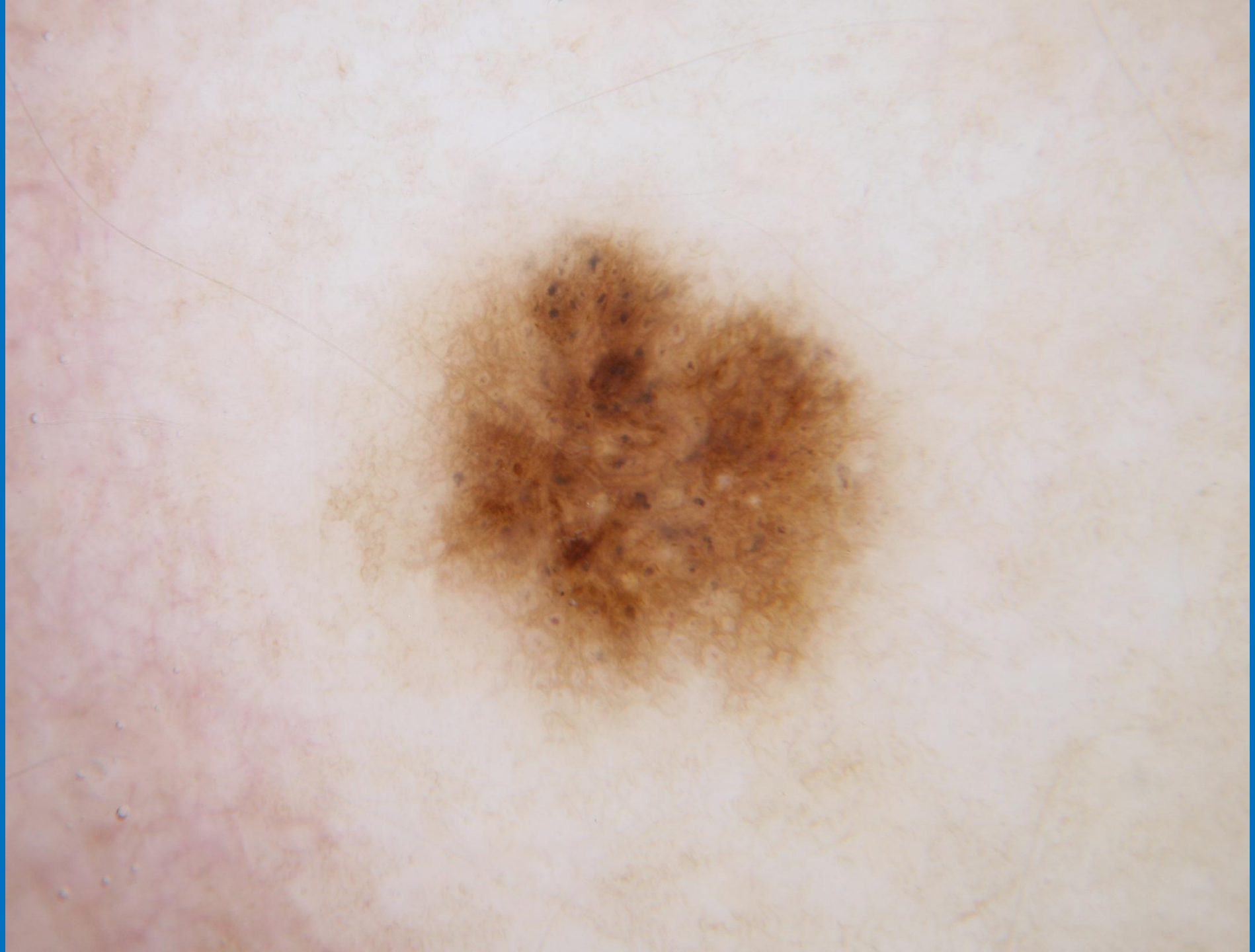


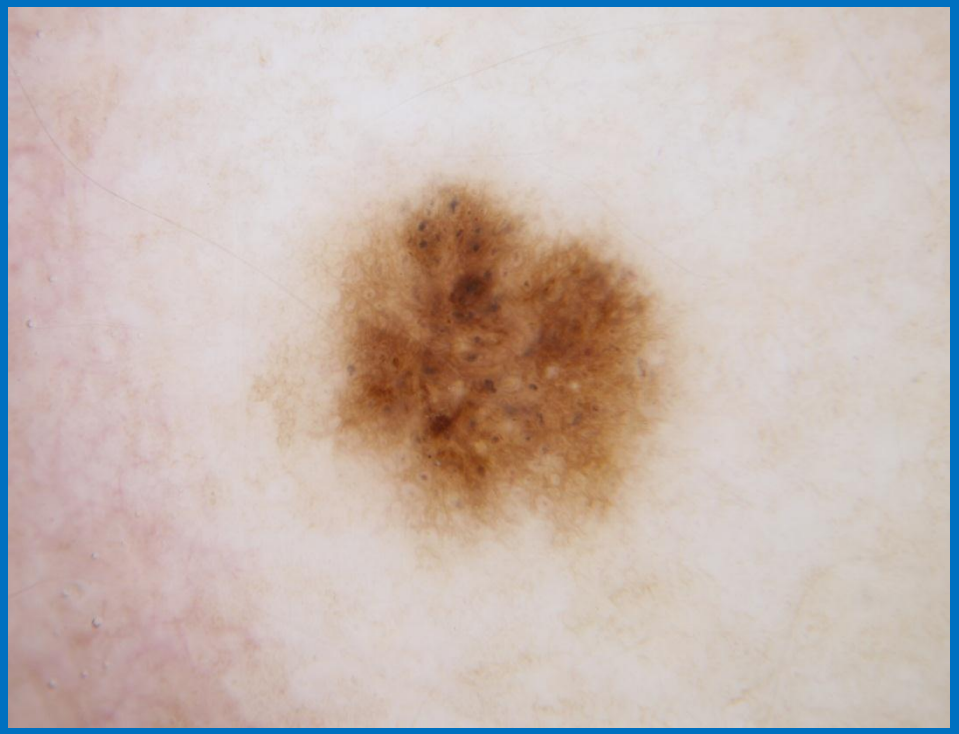


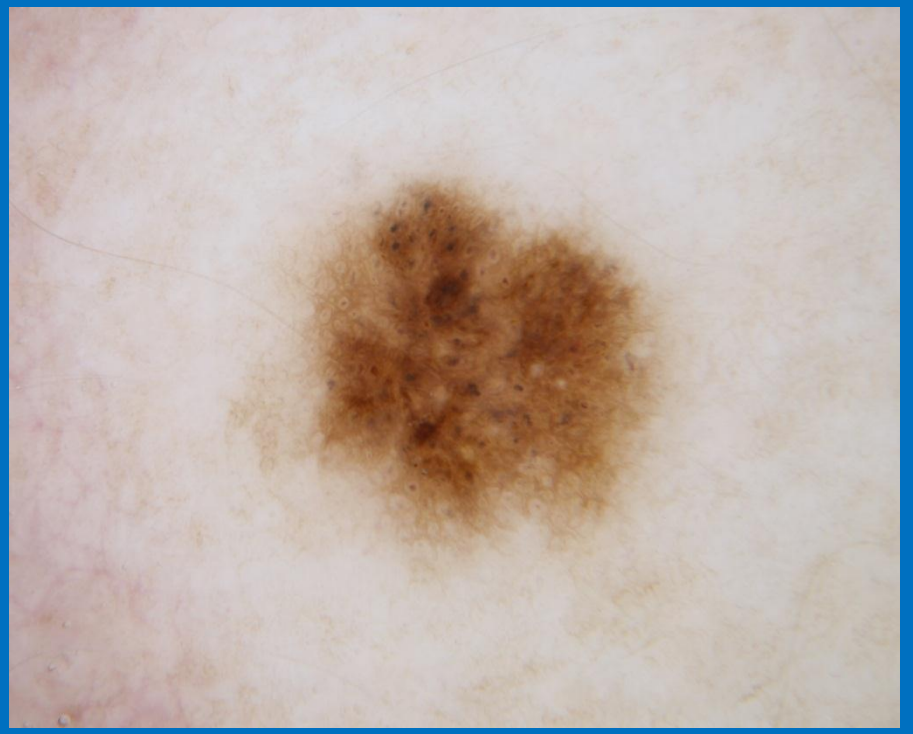
One way is by automated total body photography, as with Melanoscan ™

Another way is by digital dermatoscopic monitoring over a period of time



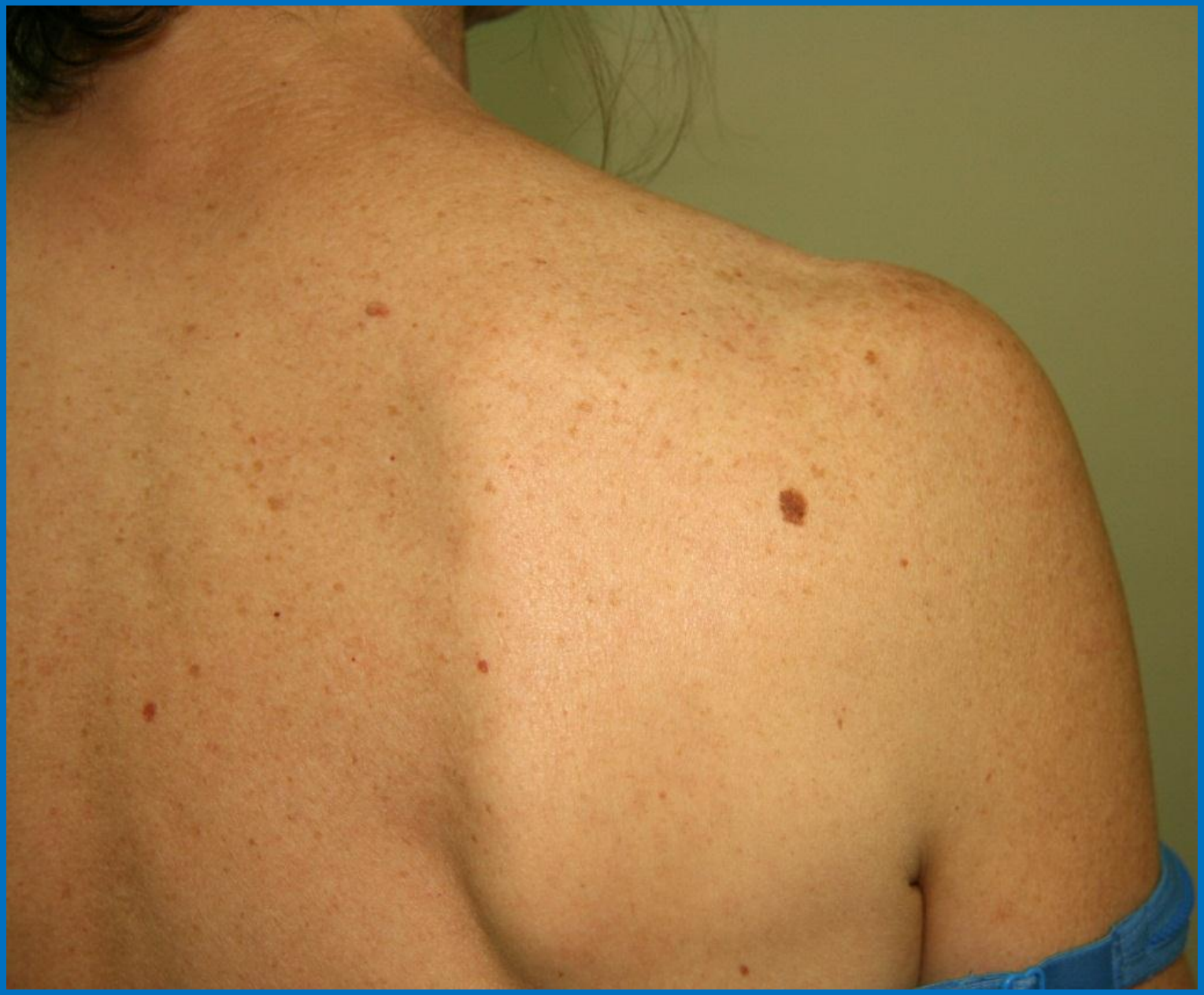


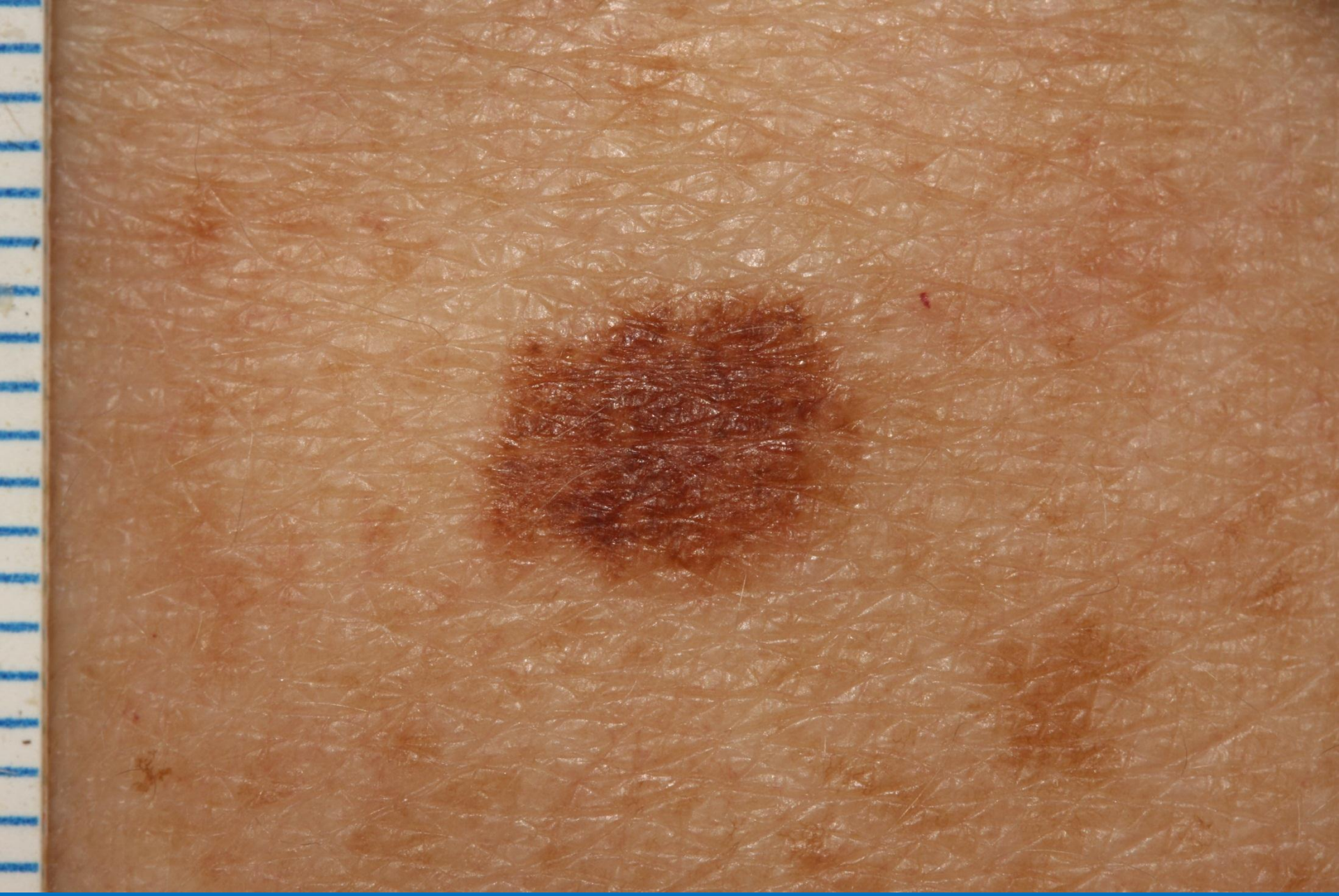


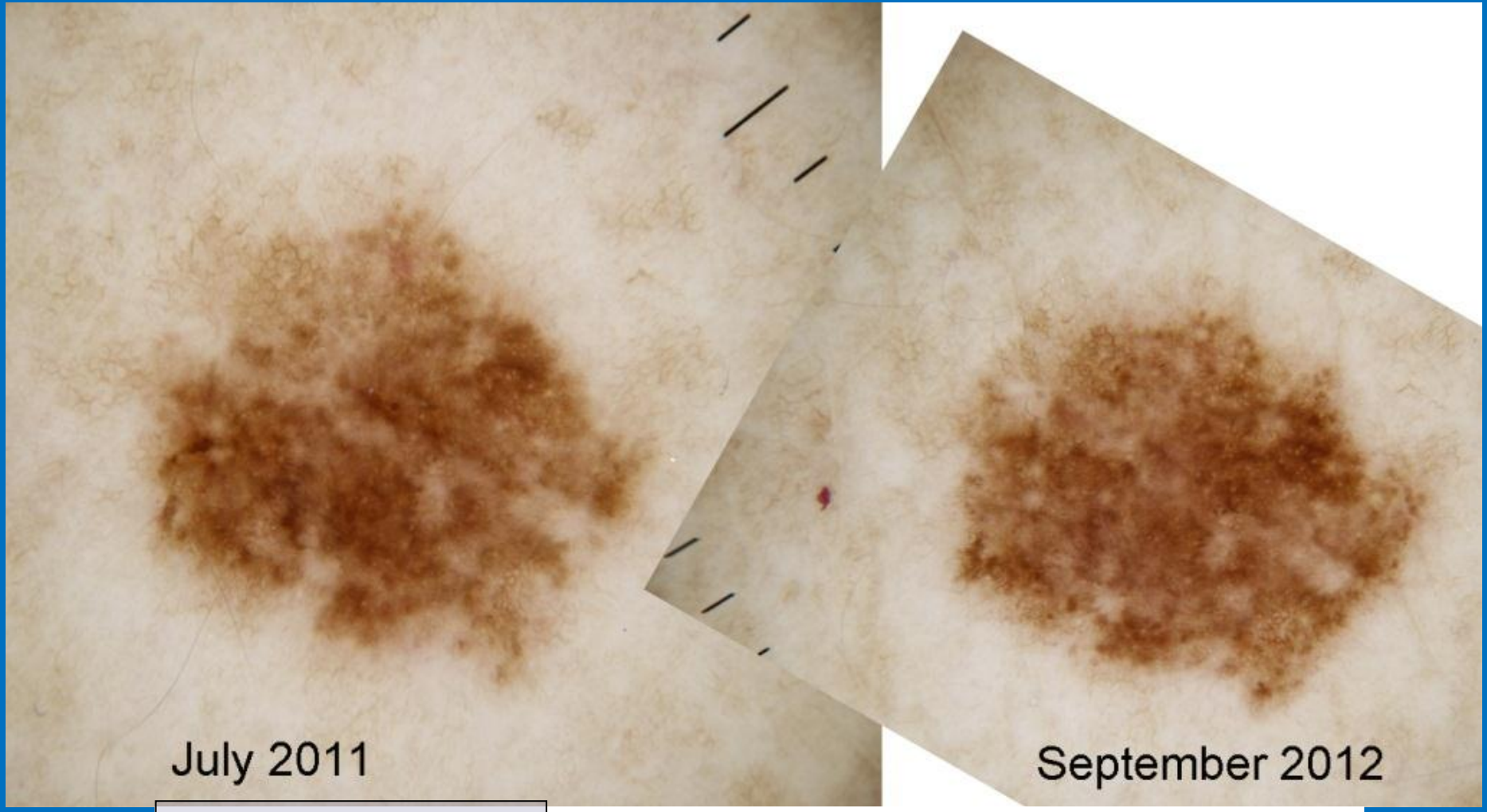


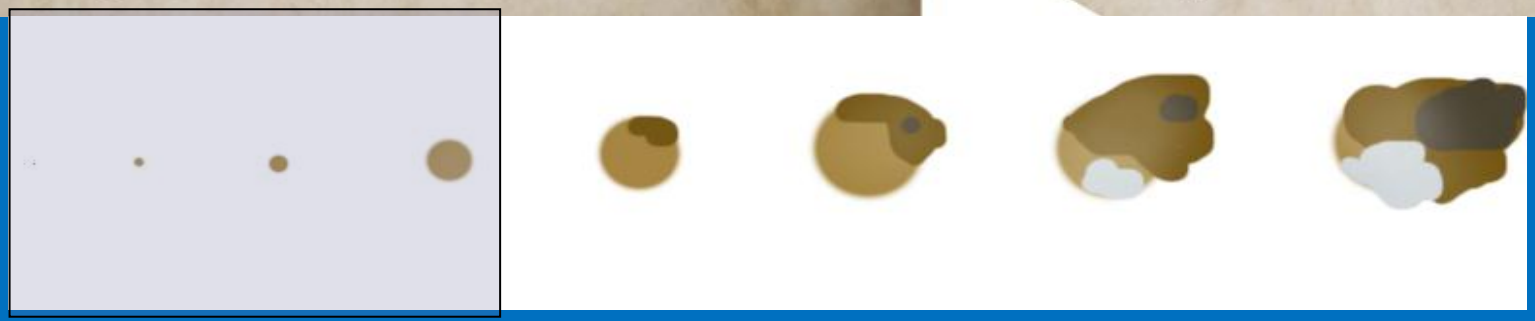
A pigmented skin lesion with Chaos and Clue (grey dots) has been monitored over 6 months because the patient declared it was stable. This is a reasonable course of action if the lesion is flat with a dermatoscopic reticular or structureless pattern. It is not advisable for a clod pattern because clod-pattern melanomas have been shown to have a faster growth rate. This lesion did not change and was not excised.

[30]

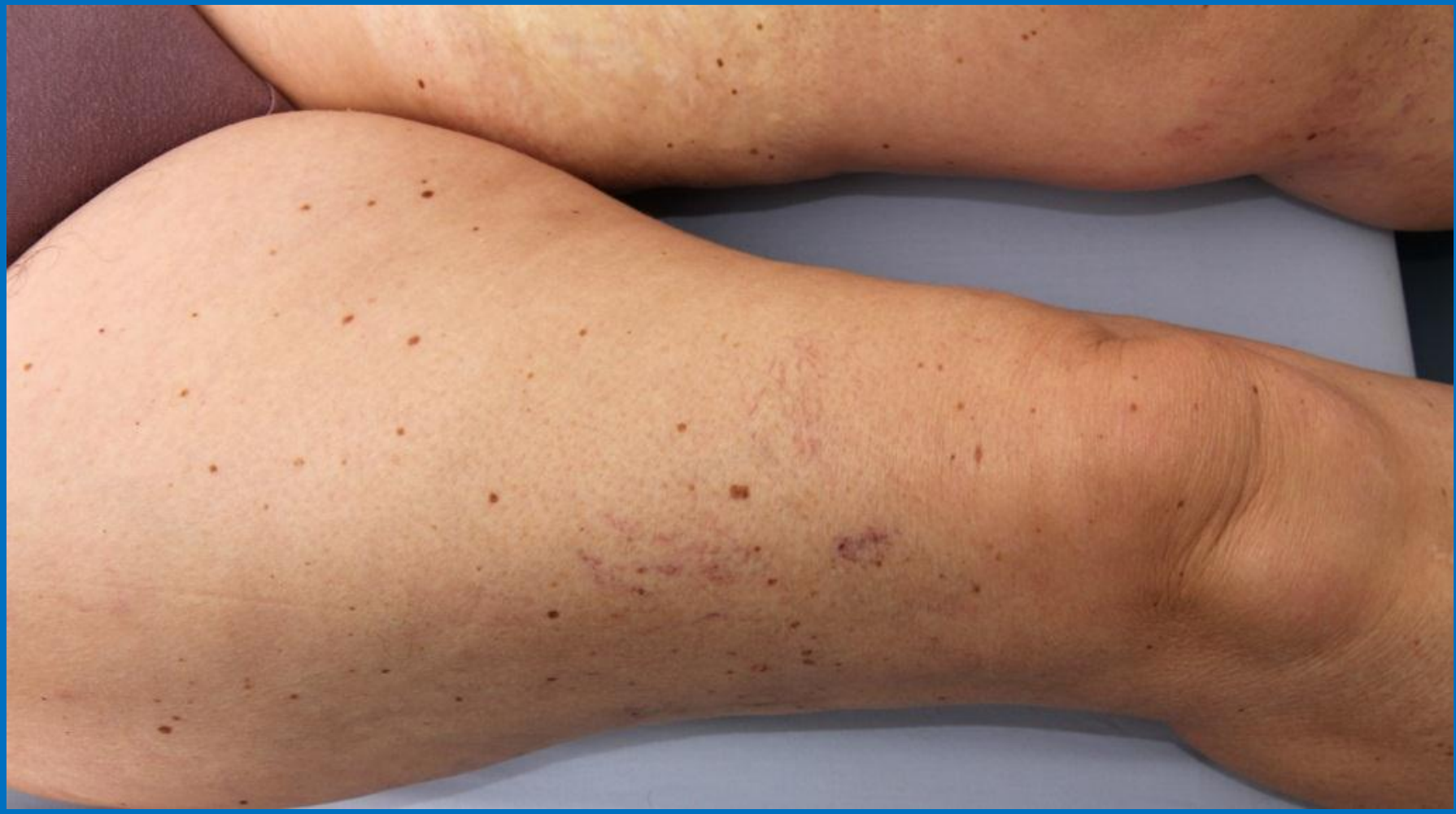




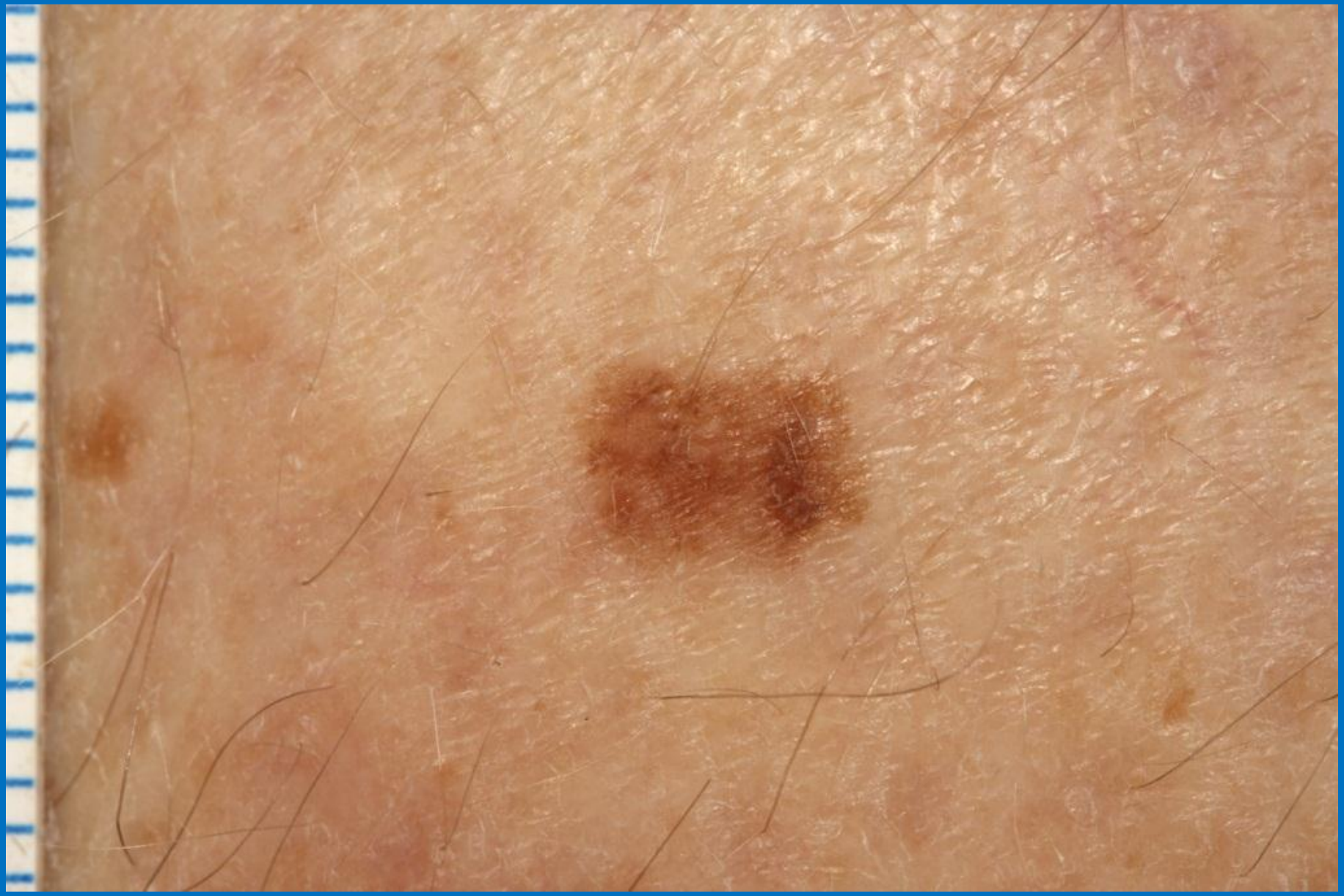




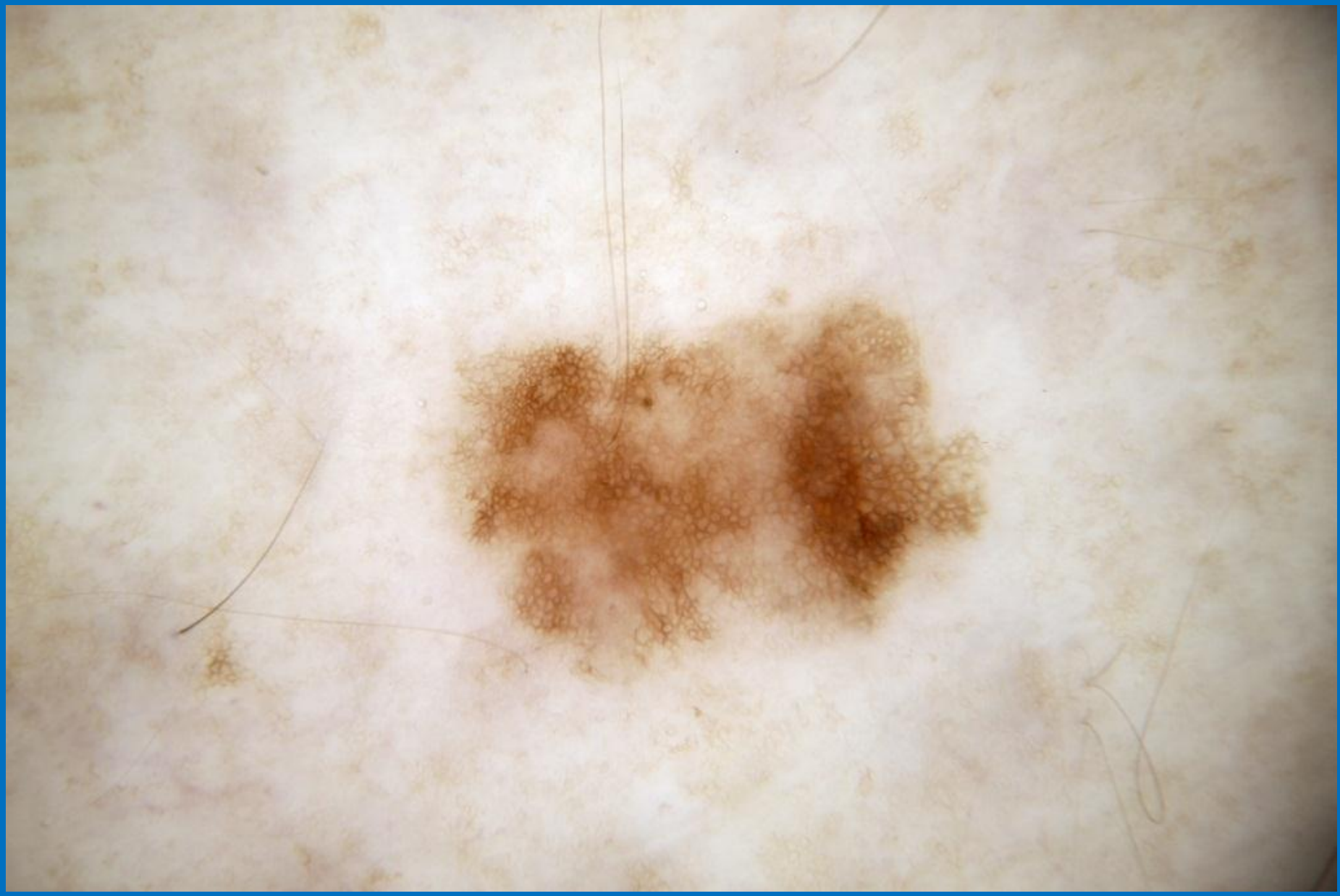
This lesion with no convincing dermatoscopic clues to malignancy changed over 12 months
In-situ melanoma. It was monitored because it “broke the pattern” substantially.



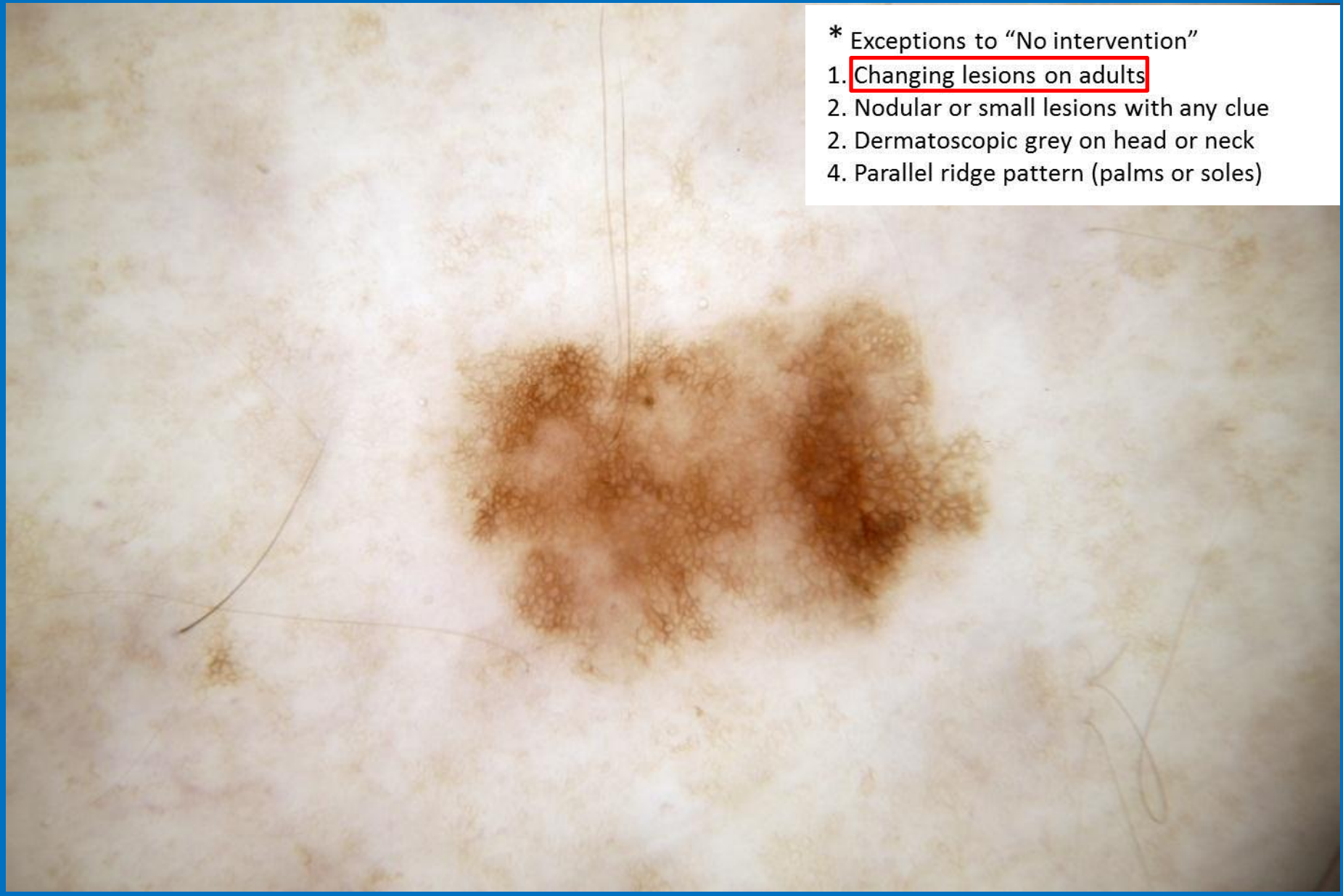
The patient reported that this lesion had changed – two lesions had become one.
Also a rectangular skin lesion is not expected.



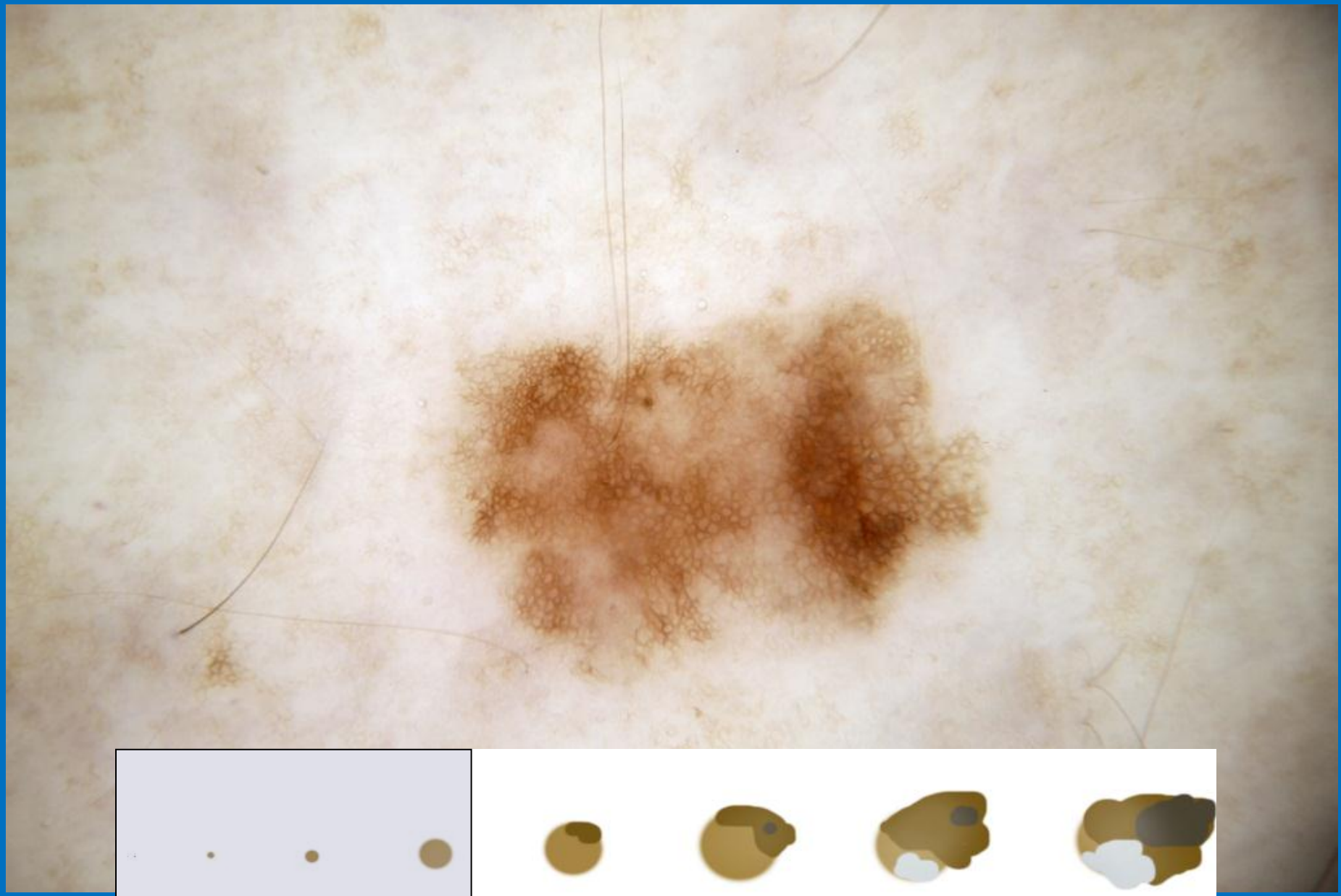
A rectangular naevus is not expected



Dermatoscopically clues to malignancy were non-existent, or at most borderline



In-situ melanoma



Dr Finbar McGrady attended a presentation in early 2013 much like this presentation. He was working for 12 months in Australia then returning to Ireland which has a low incidence and high mortality with respect to melanoma. He had never seen one. He spent a day working with the practitioner who had given the presentation and that day he saw his first melanoma.

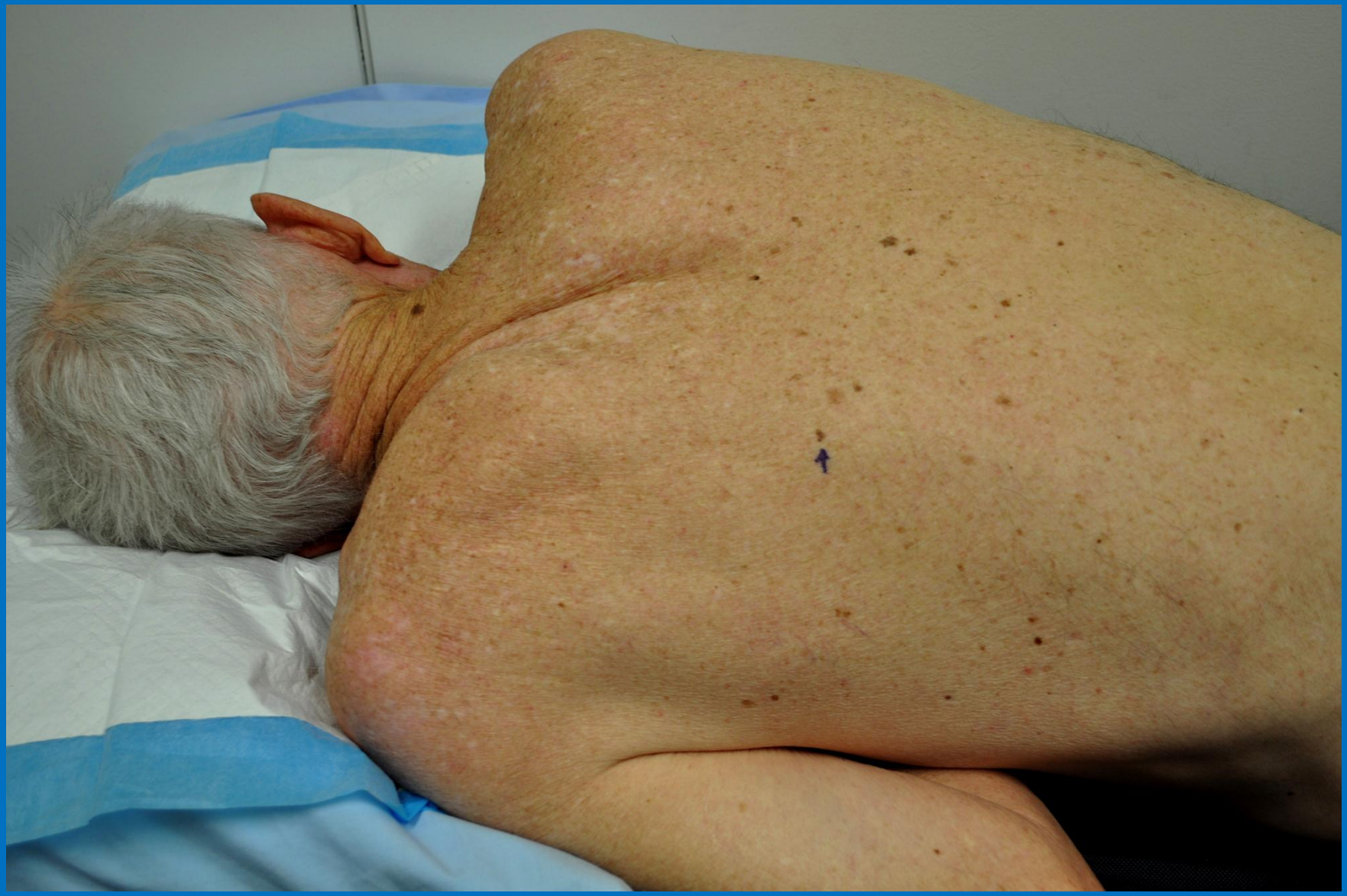
He sent this email one week later:

Hi Cliff,

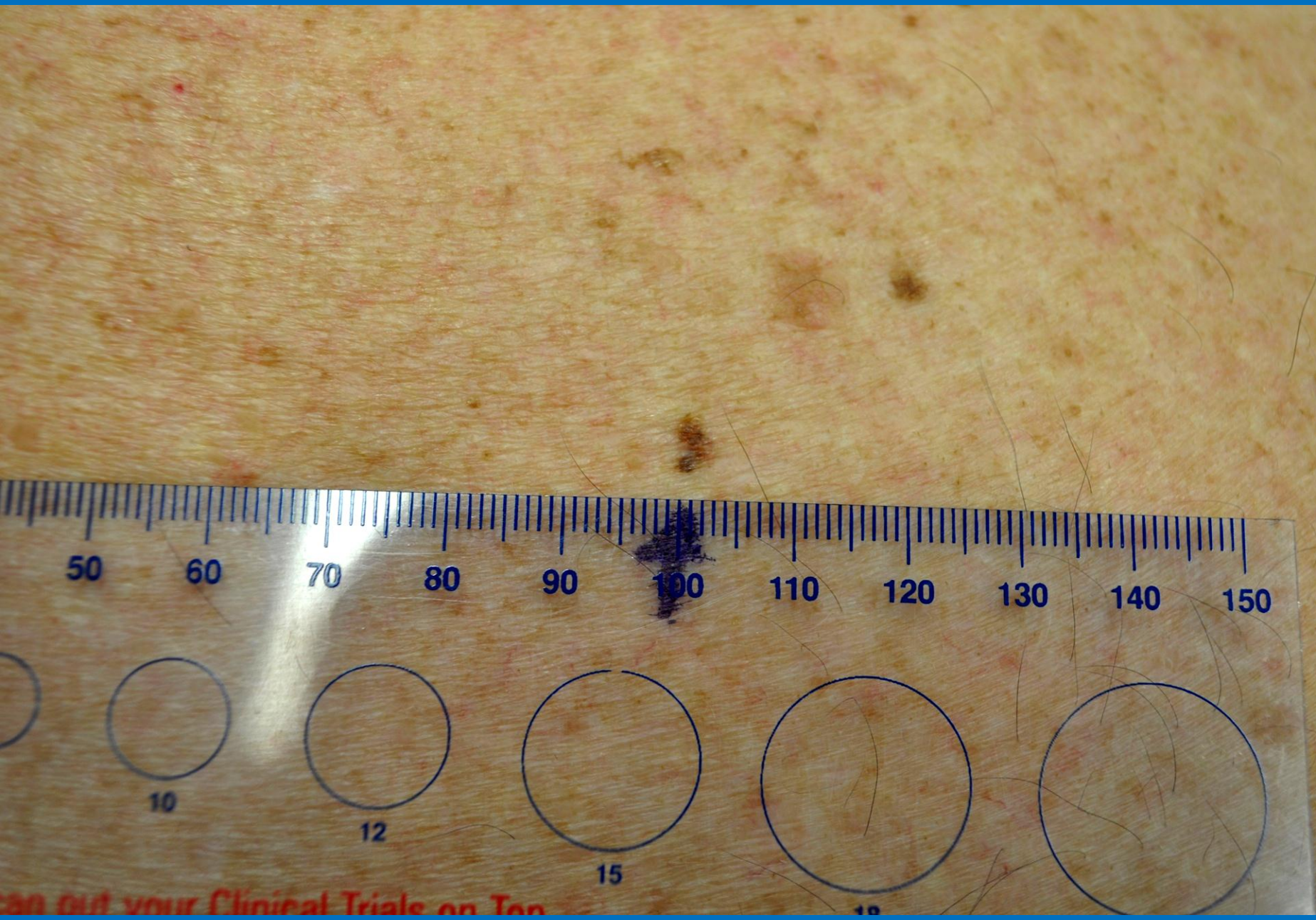
…

This guy was worried about a seb K on his arm. I advised a full skin check and found this …

All the best,
Finbar McGrady



This patient had attended with a benign lesion on his arm. Dr McGrady asked him to remove his clothes and systematically examined the rest of his body. A small lesion on his back “broke the pattern” in a subtle way…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3gen

“LOST MY MELANOMA VIRGINITY!”

Hi Cliff,
Its a bit weird I'm so excited about this but I found my first melanoma! Clark Level 2, Breslow 0.38mm.
This guy was worried about a seb K on his arm. I advised a full skin check and found this!
If you don’t look you won’t see! **Thanks again for all your help. Now looking for the next one!**

All the best,
Finbar McGrady

Look for the break in the pattern…

Scan for chaos…

Examine for clues…

A= Asymmetry. Score (0-2)x1.3

B= Border sharpness. Score (0-8)x0.1

C= Colours (light brown, dark brown, black, red, white, blue-grey. Score (1-6)x0.5

D= Dermoscopic structures (Dots, globules, structureless, network, branched streaks. Score (1-5)x0.5

Benign <4.75
Suspicious 4.75-5.45
Malignant >5.45

Major criteria? – 2 points
Minor criteria? – 1 point
> Or = 3 – Melanoma

Melanocytic criteria?
Melanocytic by default?
Not a single colour
Not symmetrical
One of 9 clues?
Special site clues?

CHAOS & CLUES

We are not claiming that Chaos and Clues is more sensitive than other methods but it has been evaluated on both melanocytic and non-melanocytic lesions on a test series of pigmented lesions excised with suspicion of malignancy and with predominantly in-situ melanomas. It is simple to use and is adapted for the work-flow of routine practice. It provides a framework on which to build accumulated experience.

If there is more than one way to skin a cat why not choose the easiest method?

Harald Kittler

Thank you!

cliffrosendahl@bigpond.com

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