Structures Associated with melanoma

AMERICAN DERMOSCOPY MEETING

June 30, 2022 - 4:00 – 4:30pm
St George, Utah

UHealth
UNIVERSITY OF MIAMI HEALTH SYSTEM

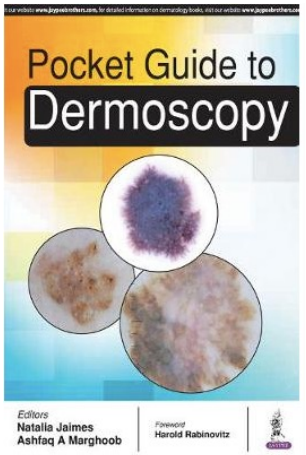
DR. PHILLIP FROST DEPARTMENT OF DERMATOLOGY AND CUTANEOUS SURGERY

SYLVESTER COMPREHENSIVE CANCER CENTER
UNIVERSITY OF MIAMI HEALTH SYSTEM

Natalia Jaimes, MD
Assistant Professor
University of Miami

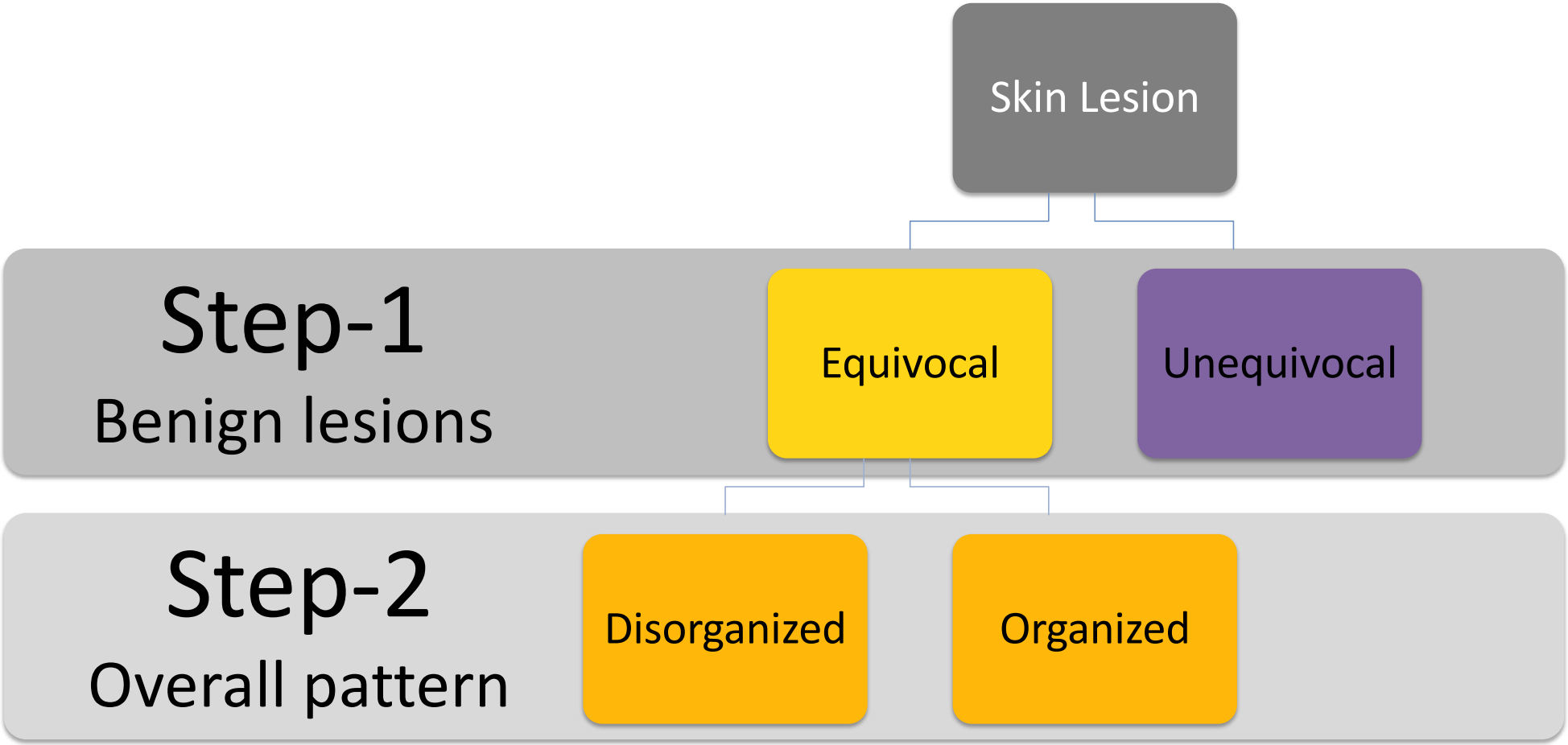
Disclosures

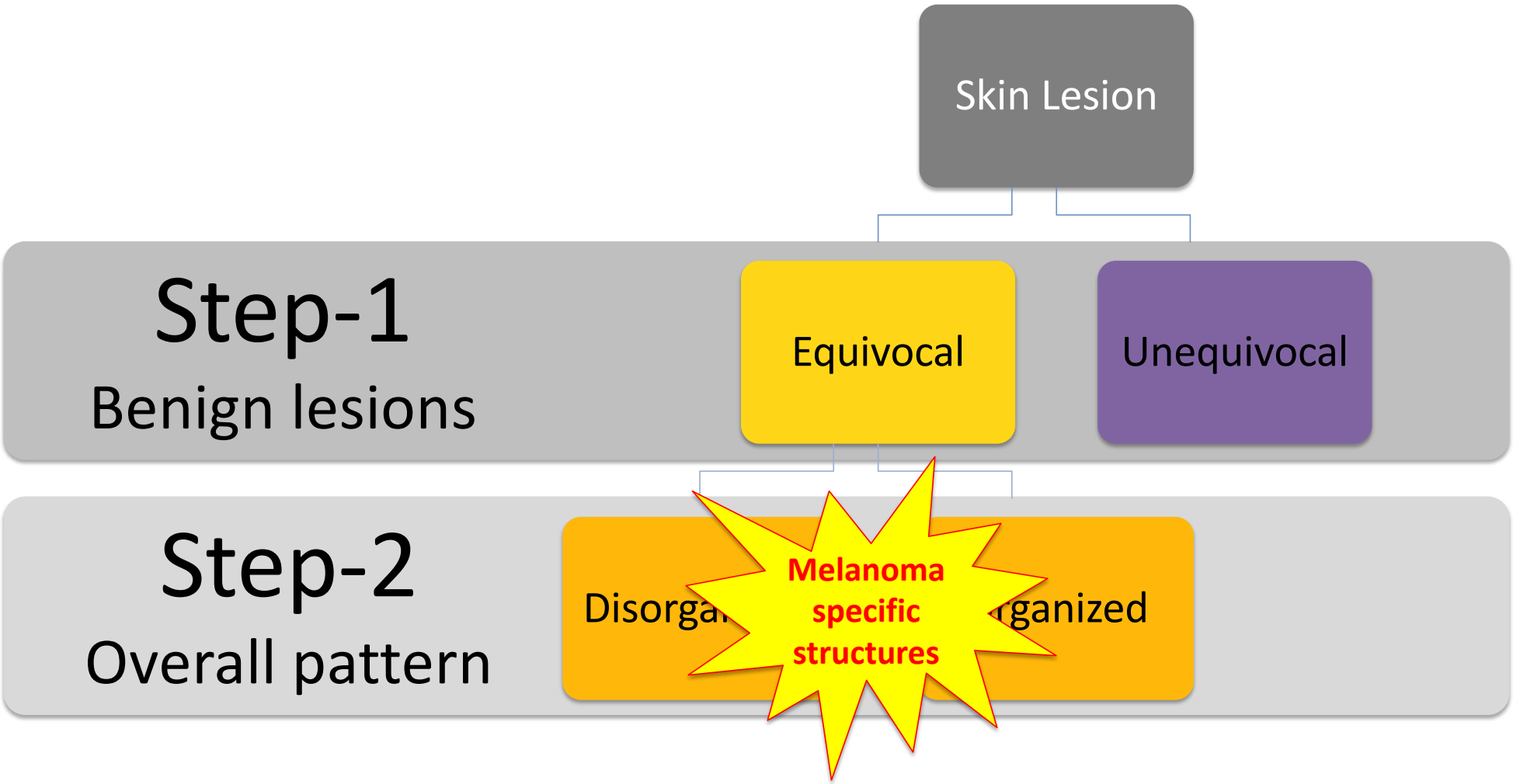
- Pocketguide to Dermoscopy
- UpToDate
- Lecturing/Honoraria



Outline

- 2-step algorithm
- Melanoma specific structures


Skin Lesion
Step-1
Benign lesions
Equivocal
Unequivocal
Step-2
Overall pattern
Disorganized
Organized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Melanoma specific structures

Research

JAMA Dermatology | Original Investigation

Assessment of Diagnostic Accuracy of Dermoscopic Structures and Patterns Used in Melanoma Detection

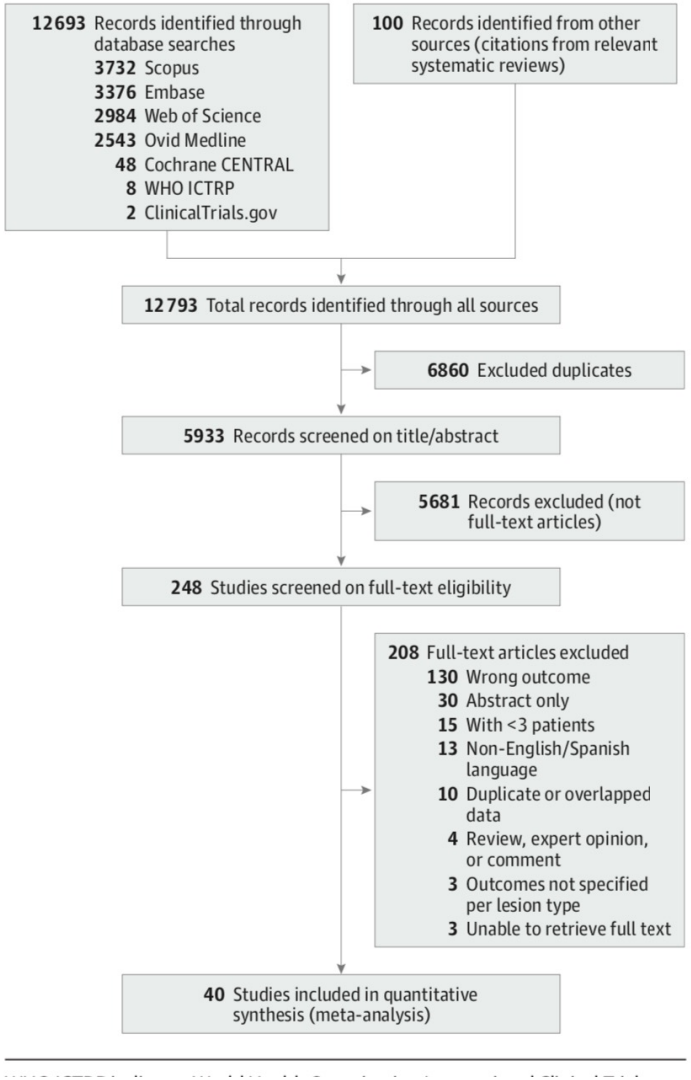
A Systematic Review and Meta-analysis

Natalie M. Williams, MD; Kristina D. Rojas, BS; John M. Reynolds, MLIS; Deukwoo Kwon, PhD; Jackie Shum-Tien, MD; Natalia Jaimes, MD

JAMA Dermatol. doi:10.1001/jamadermatol.2021.2845
Published online August 4, 2021.

- Dermoscopic structures associated with melanoma detection tended to have higher specificity compared with sensitivity, with each structure yielding a **specificity greater than 70%**.

Figure. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram



Structures and Patterns

Highest OR for melanoma

- Shiny white structures
  - (OR, 6.7; 95% CI, 2.5-17.9)
- Pseudopods
  - (OR, 6.7; 95% CI, 2.7-16.1)
- Irregular pigmentation
  - (OR, 6.4; 95% CI, 2.0-20.5)
- blue-white veil
  - (OR, 6.3; 95% CI, 3.7-10.7),
- Peppering
  - (OR, 6.3; 95% CI, 2 .4-16.1).

Highest specificity

- **Pseudopods**
  - (97.3%; 95% CI, 94.3%-98.7%)
- Shiny white structures
  - (93.6%; 95% CI, 85.6%-97.3%),
- Peppering
  - (93.4%; 95% CI, 81.9%-97.8%)
- Streaks
  - (92.1%; 95% CI, 88.4%-94.7%)

Highest sensitivity

- **irregular pigmentation**
  - (62.3%; 95% CI, 31.2%-85.8%),
- **blue-white veil**
  - (60.6%; 95% CI, 46.7%-72.9%),
- atypical network
  - (56.8%; 95% CI, 43.6%-69.2%),
- multicomponent pattern
  - (53.7%; 95% CI, 40.4%-66.4%).

Prespecified outcome measures: Diagnostic accuracy (sensitivity and specificity) and risk (odds ratio [OR]) of melanoma

Research

JAMA Dermatology | Original Investigation

Assessment of Diagnostic Accuracy of Dermoscopic Structures and Patterns Used in Melanoma Detection

A Systematic Review and Meta-analysis

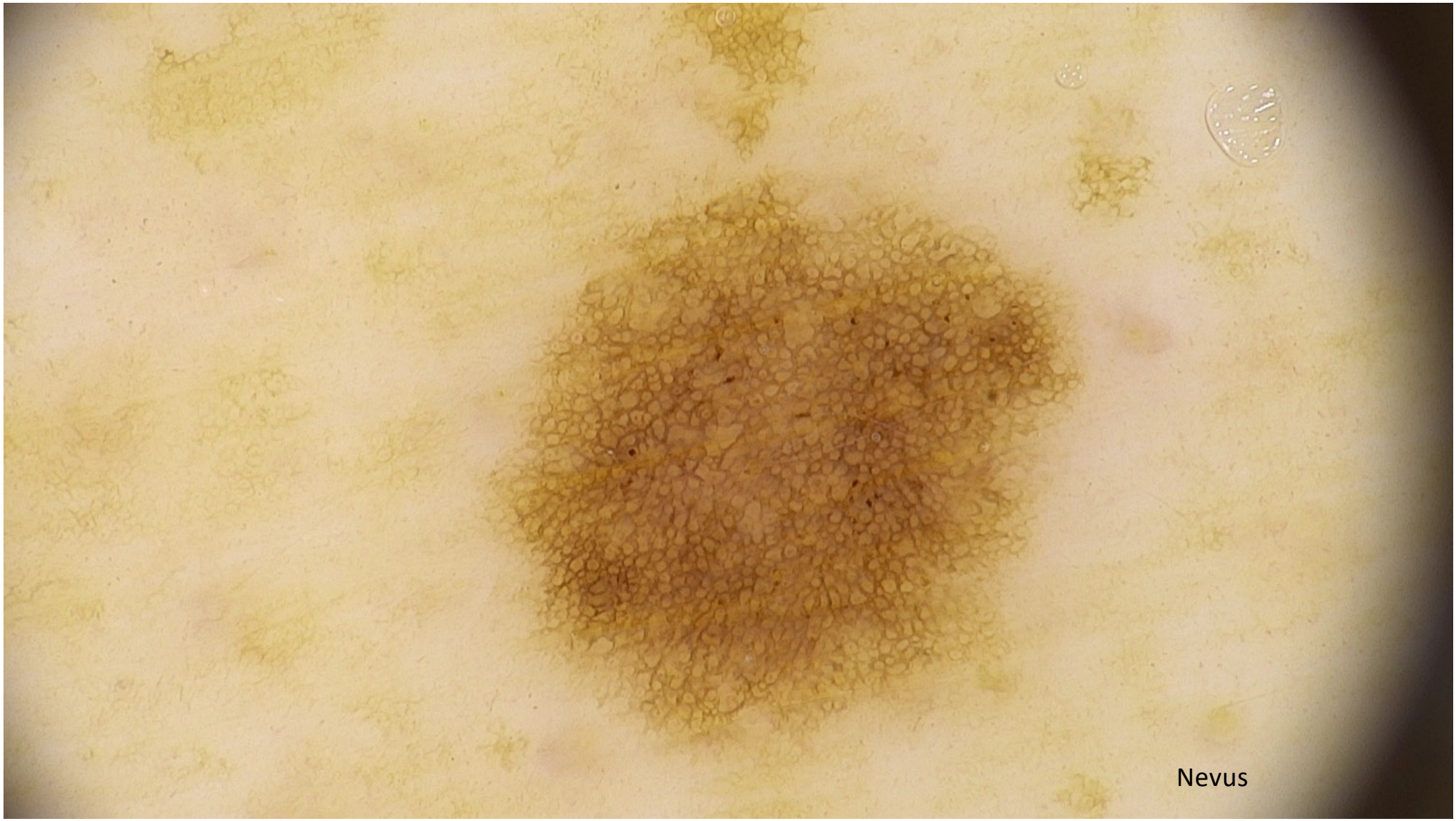
Natalie M. Williams, MD; Kristina D. Rojas, BS; John M. Reynolds, MLIS; Deukwoo Kwon, PhD; Jackie Shum-Tien, MD; Natalia Jaimes, MD

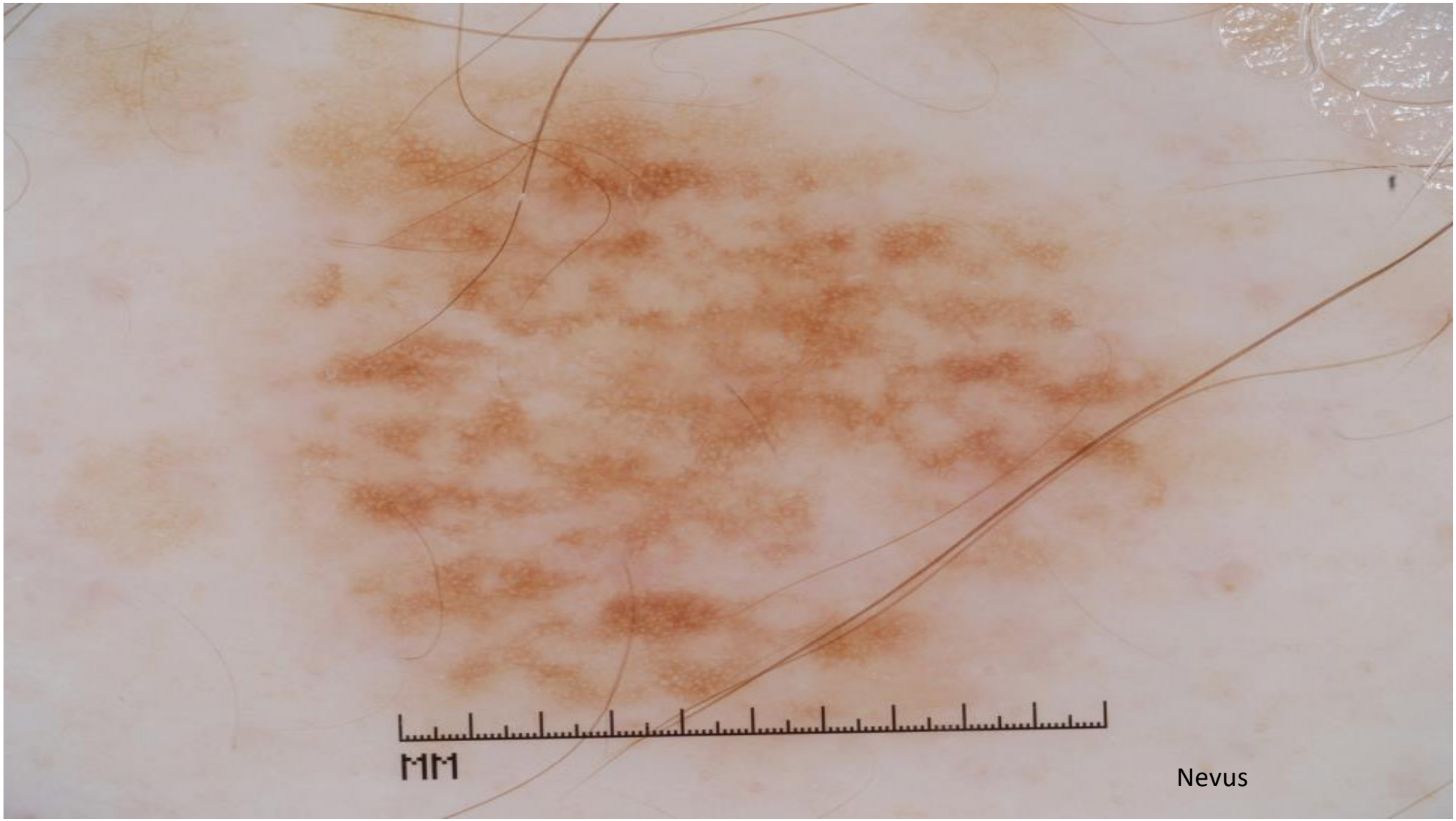
- Diagnostic importance of dermoscopic structures associated with melanoma detection (eg, shiny white structures, BWV)
- Corroborated the importance of the **overall pattern**
- May suggest a hierarchy in the significance of structures and patterns.

Diagnosis of melanoma

- Evaluate the lesion as a whole
- The more melanoma-specific structures that are present in a lesion, the higher the odds the lesion is melanoma

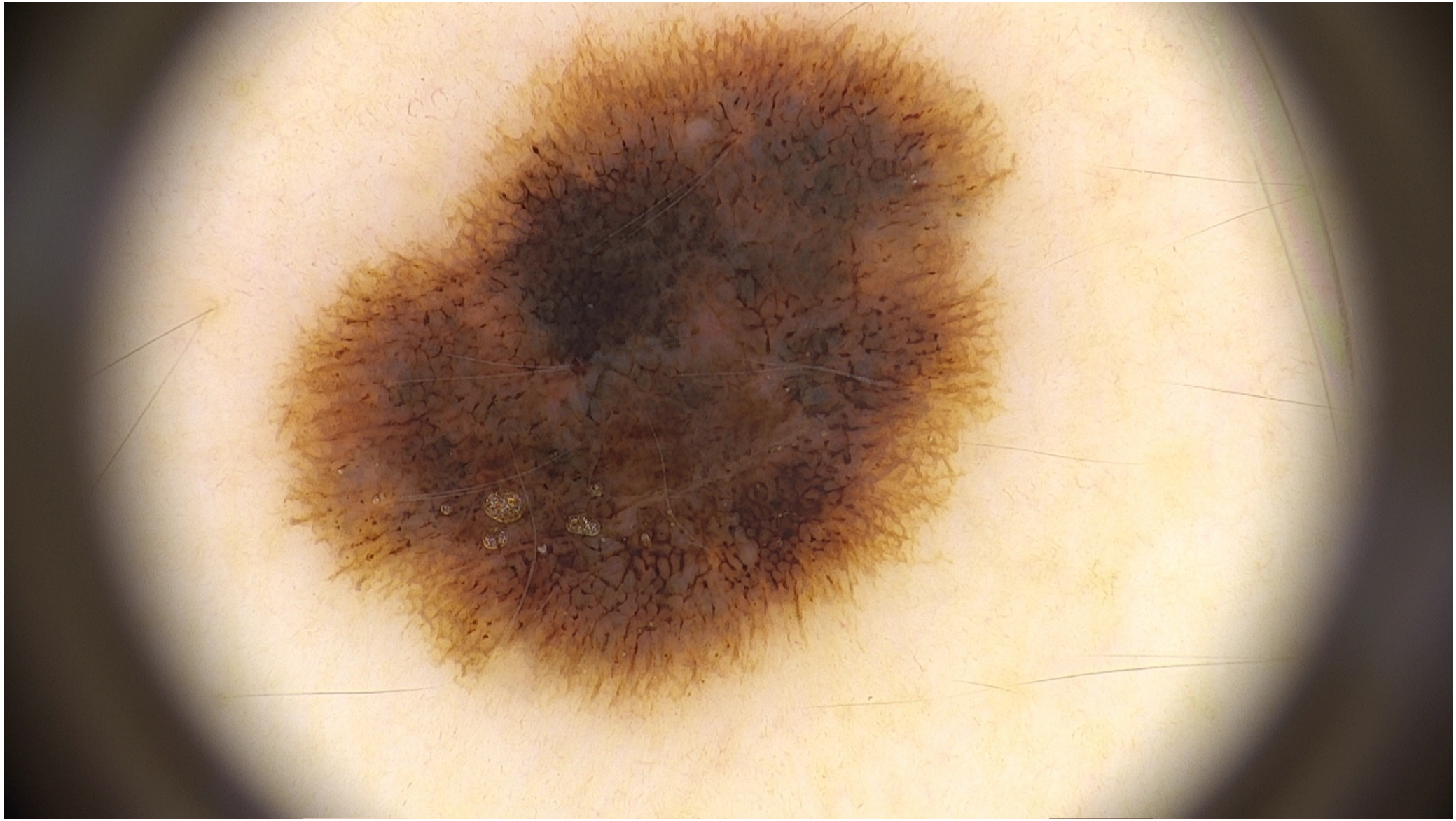
Let’s see some cases!

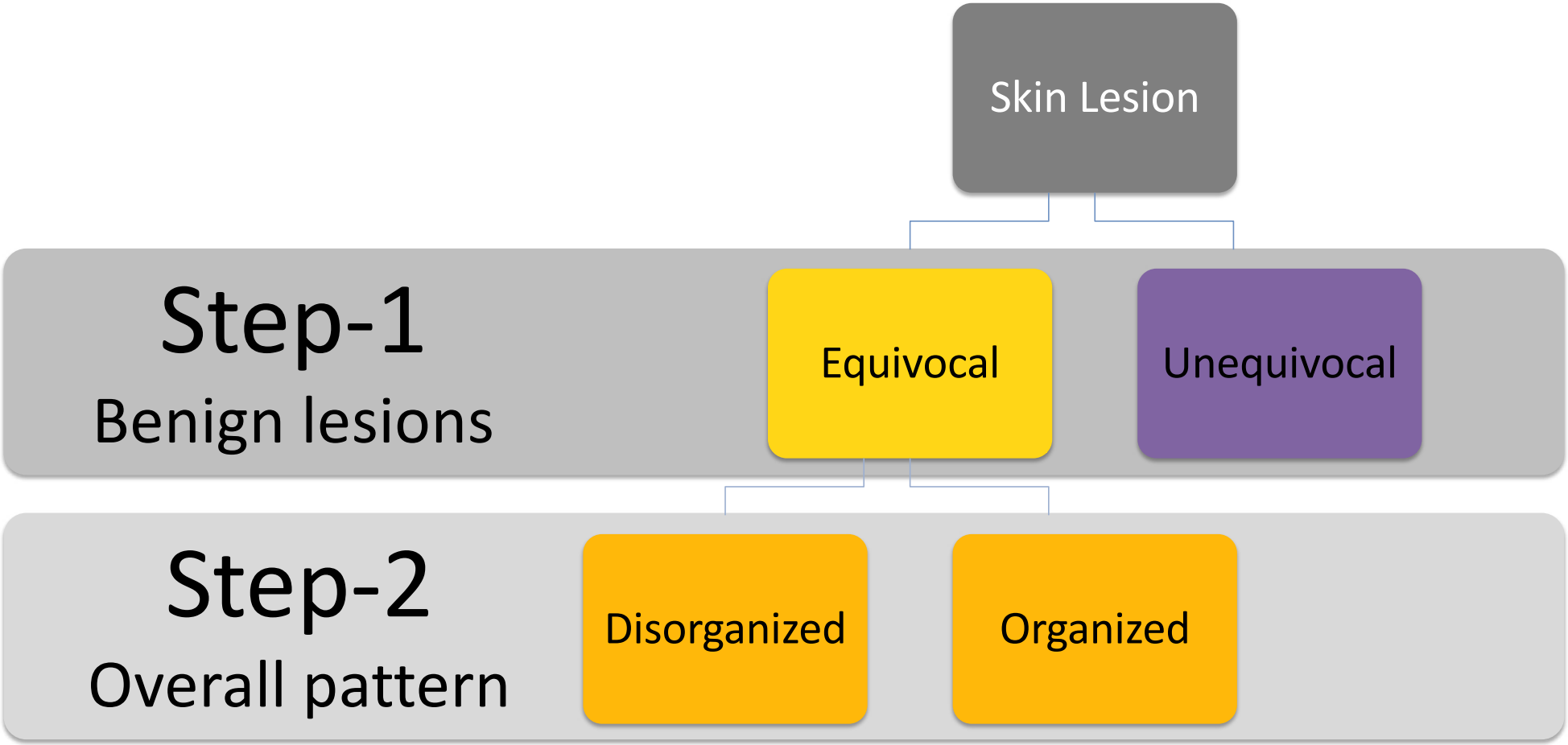

Nevus


Nevus

Nevus

Congenital Melanocytic Nevi
Nevus




Skin Lesion
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Overall pattern
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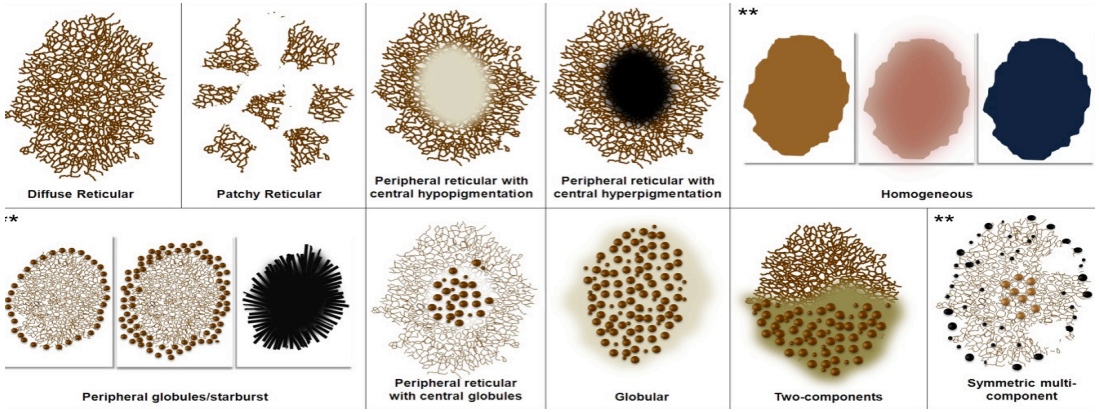
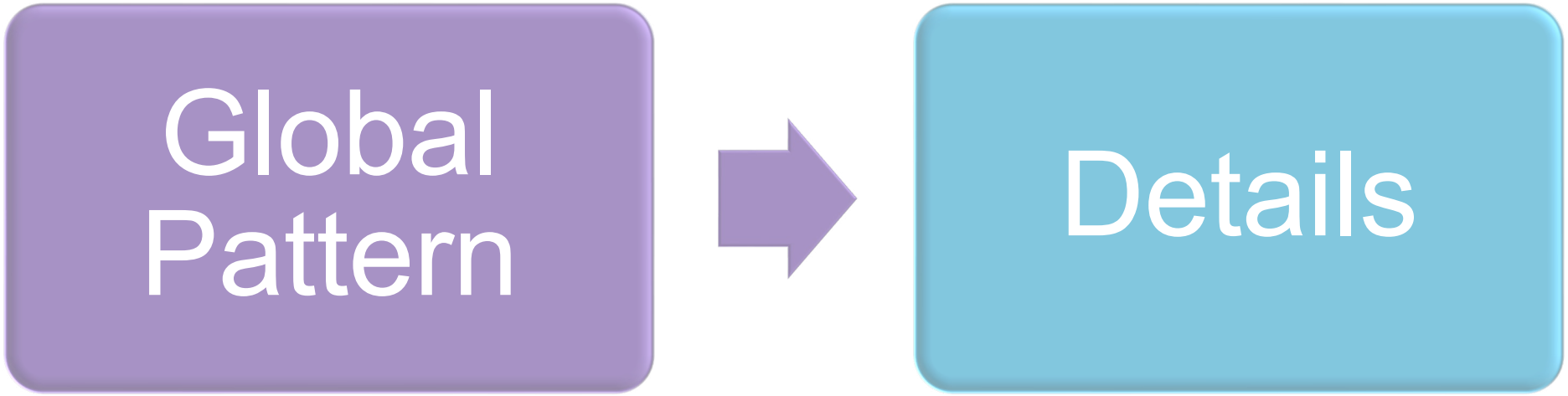
Pattern Analysis

Global Pattern



organized *vs* **disorganized**

Pattern Analysis



organized *vs* disorganized

Melanoma-Specific Structures

Melanoma Specific Structures

Melanoma-Specific Structures

Highest OR for melanoma

- Shiny white structures
  - (OR, 6.7; 95% CI, 2.5-17.9)
- Pseudopods
  - (OR, 6.7; 95% CI, 2.7-16.1)
- Irregular pigmentation
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- blue-white veil
  - (OR, 6.3; 95% CI, 3.7-10.7),
- Peppering
  - (OR, 6.3; 95% CI, 2 .4-16.1).

Highest specificity

- **Pseudopods**
  - (97.3%; 95% CI, 94.3%-98.7%)
- Shiny white structures
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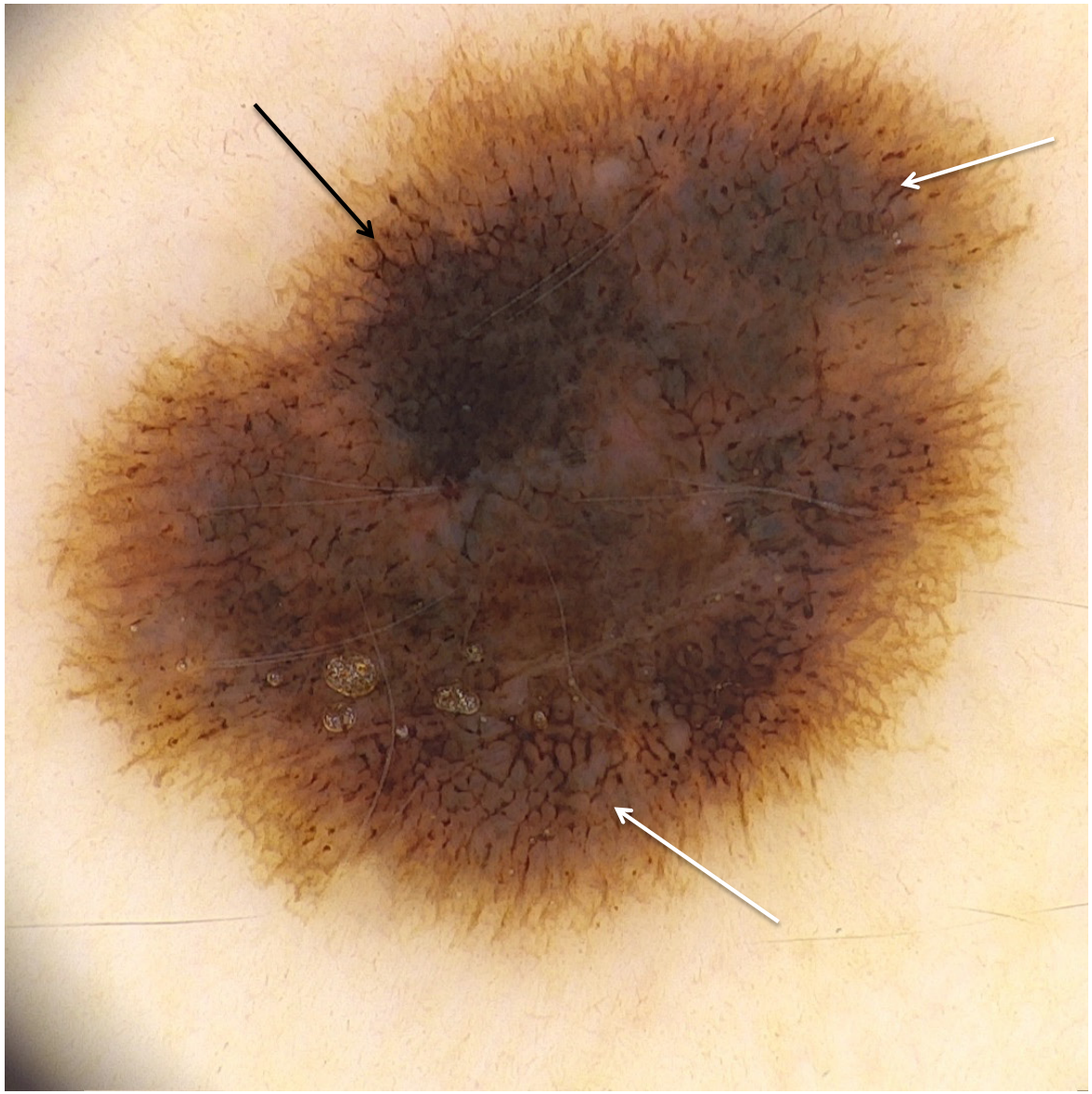
Prespecified outcome measures: Diagnostic accuracy (sensitivity and specificity) and risk (odds ratio [OR]) of melanoma

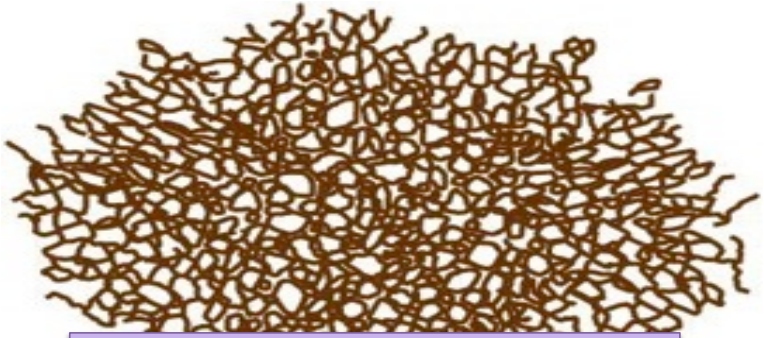


Melanoma Specific Structures

- **Atypical network**
- **Streaks** (pseudopods and radial stream
- **Negative pigment network**
- **Shiny white lines** (Crystalline structures
- **Atypical dots and/or globules**
- **Off-centered blotch**
- **Peripheral tan structureless areas**
- **Blue-white veil overlying raised areas**
- **Regression structures**
  - Blue-white veil overlying macular areas, scar-like
- **Atypical vascular structures**
  - Dotted vessels, serpentine vessels, polymorphous areas, red globules, corkscrew vessels
- **Polygonal structures (zig-zag lines)**

Network

Network



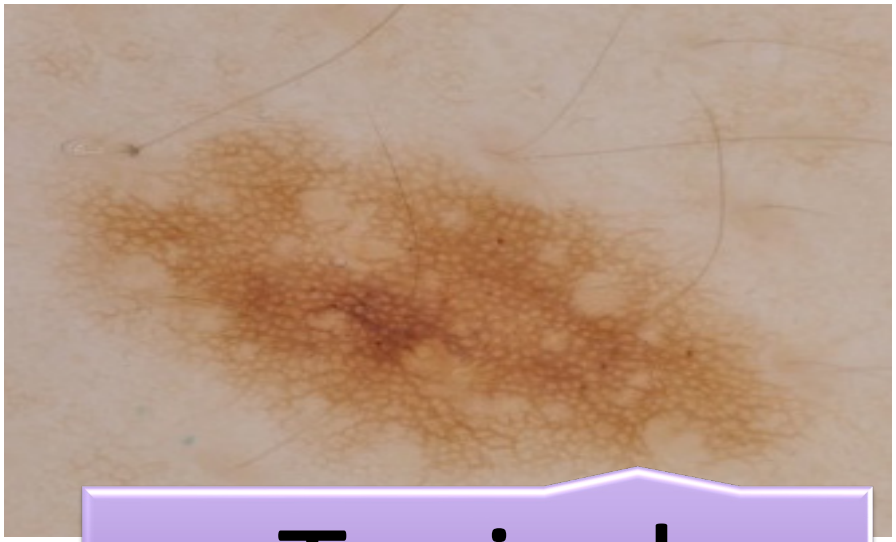
Typical

- Relatively uniform
- Regularly meshed
- Homogeneous in color
- Thinning out at the periphery

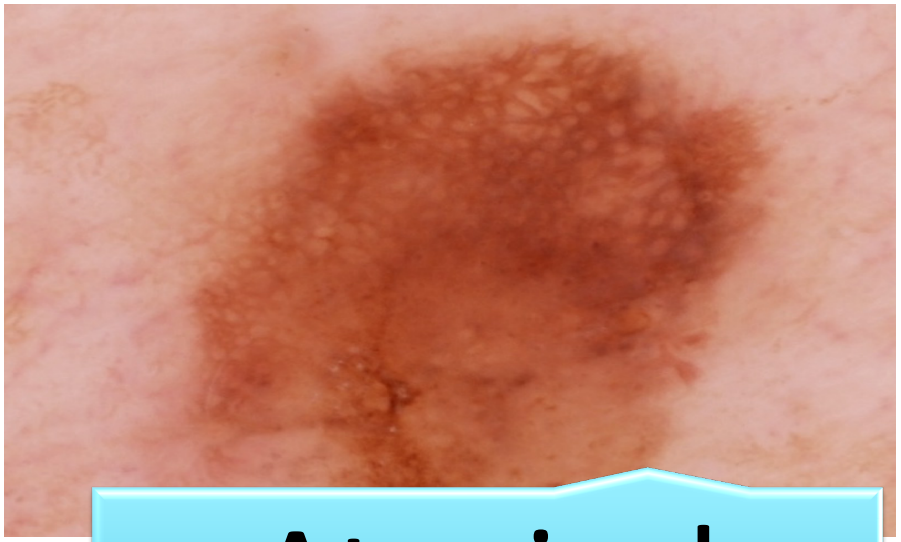
Atypical

- non-uniform.
- Darker and/or broadened lines
- “Holes” are heterogeneous
- Lines often hyperpigmented
- May end abruptly at the periphery

Network



Typical



Atypical

EDITORIAL

Remodeling of the Dermoepidermal Junction in Superficial Spreading Melanoma

Insights Gained From Correlation of Dermoscopy, Reflectance Confocal Microscopy, and Histopathologic Analysis

DIAGNOSIS IN DERMATOLOGY, WHETHER RENdered clinically or histopathologically, relies on the analytical examination of the primary morphologic features of the lesion on the gross or microscopic level, respectively. During the past 2 decades, we have begun to appreciate a new dimension in primary morphologic analysis, namely, the in vivo, en face macroscopic and microscopic morphologic features as seen via dermoscopy and reflectance confocal microscopy (RCM). Like dermoscopy, RCM reveals morphologic details of architecture in the en face plane, but, in addition, it provides morphologic information on the cellular level.[1] The ability to visualize a lesion's primary morphologic features on multiple different levels has fueled new insights into the biological evolution of lesions. This month's *Archives of Dermatology* features an important article by Pellacani et al[2] that correlates dermoscopic structures of melanocytic lesions with RCM and histopathologic analysis. This editorial, which is based on the findings reported by Pellacani et al[2] and other correlation studies on dermoscopy, RCM, and histopathology,[1,3-5] offers new theoretical insights

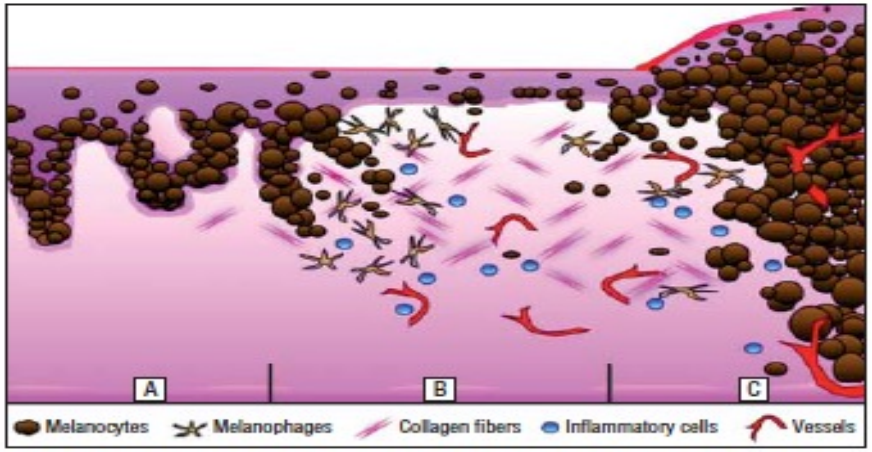
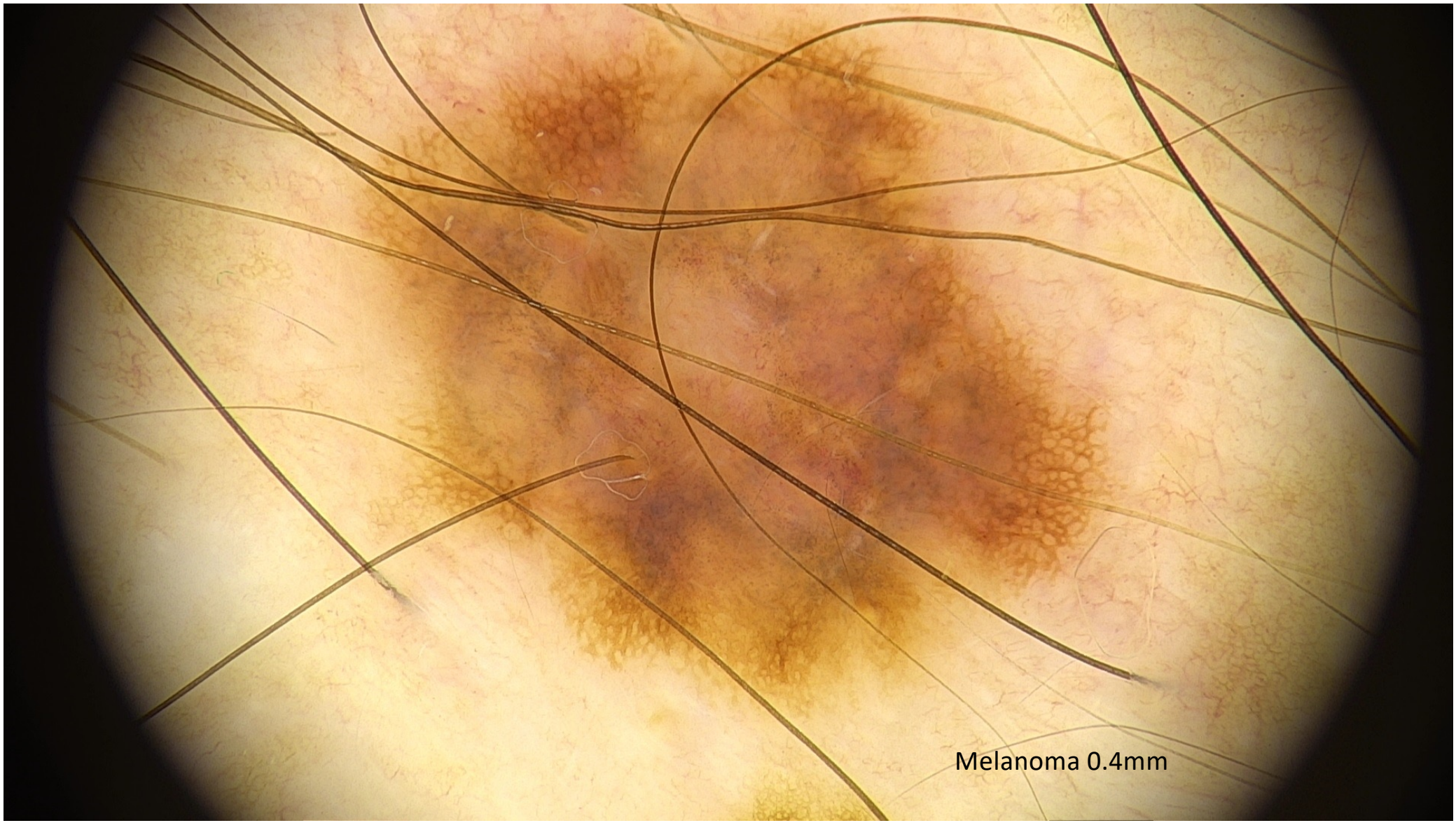
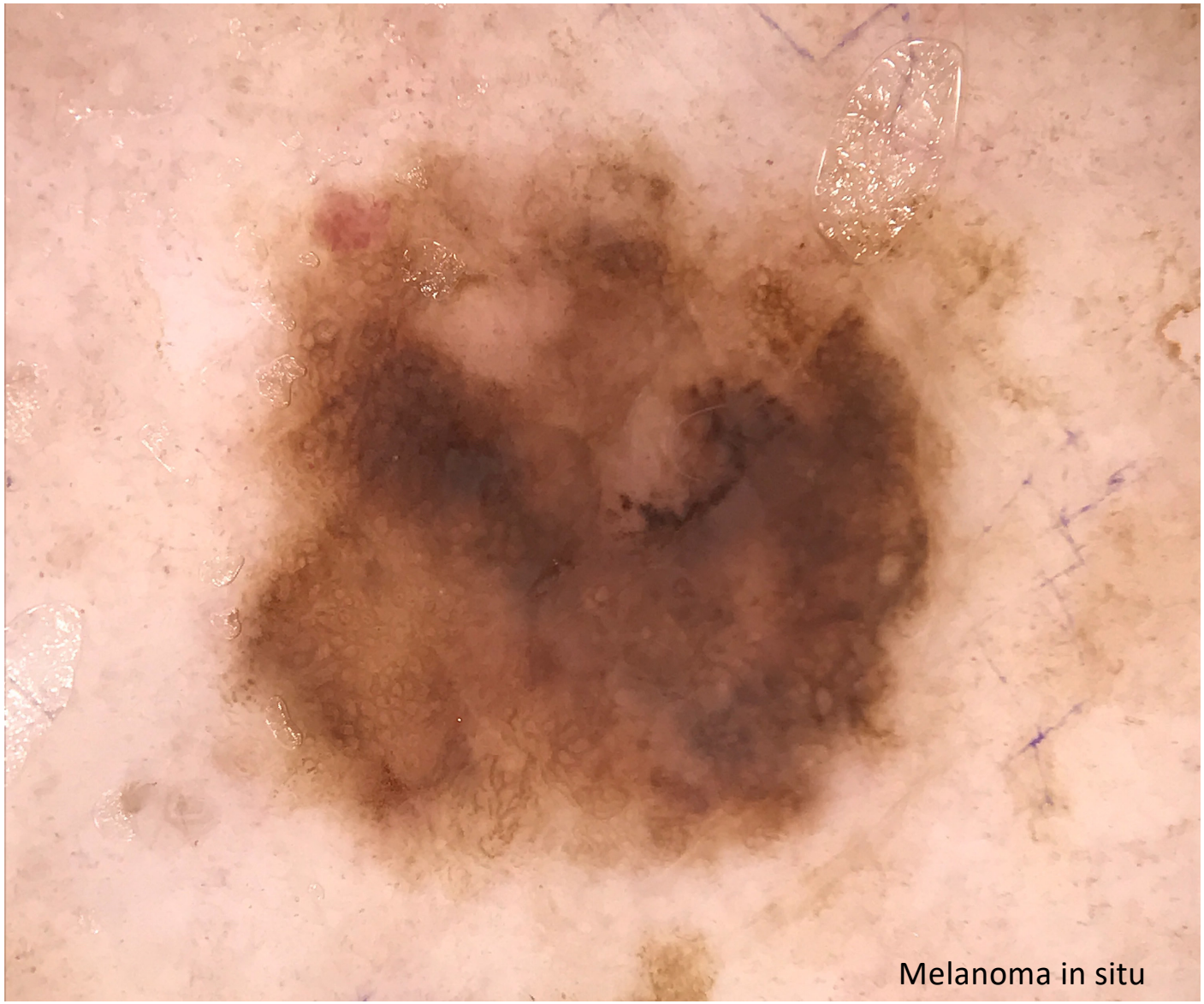
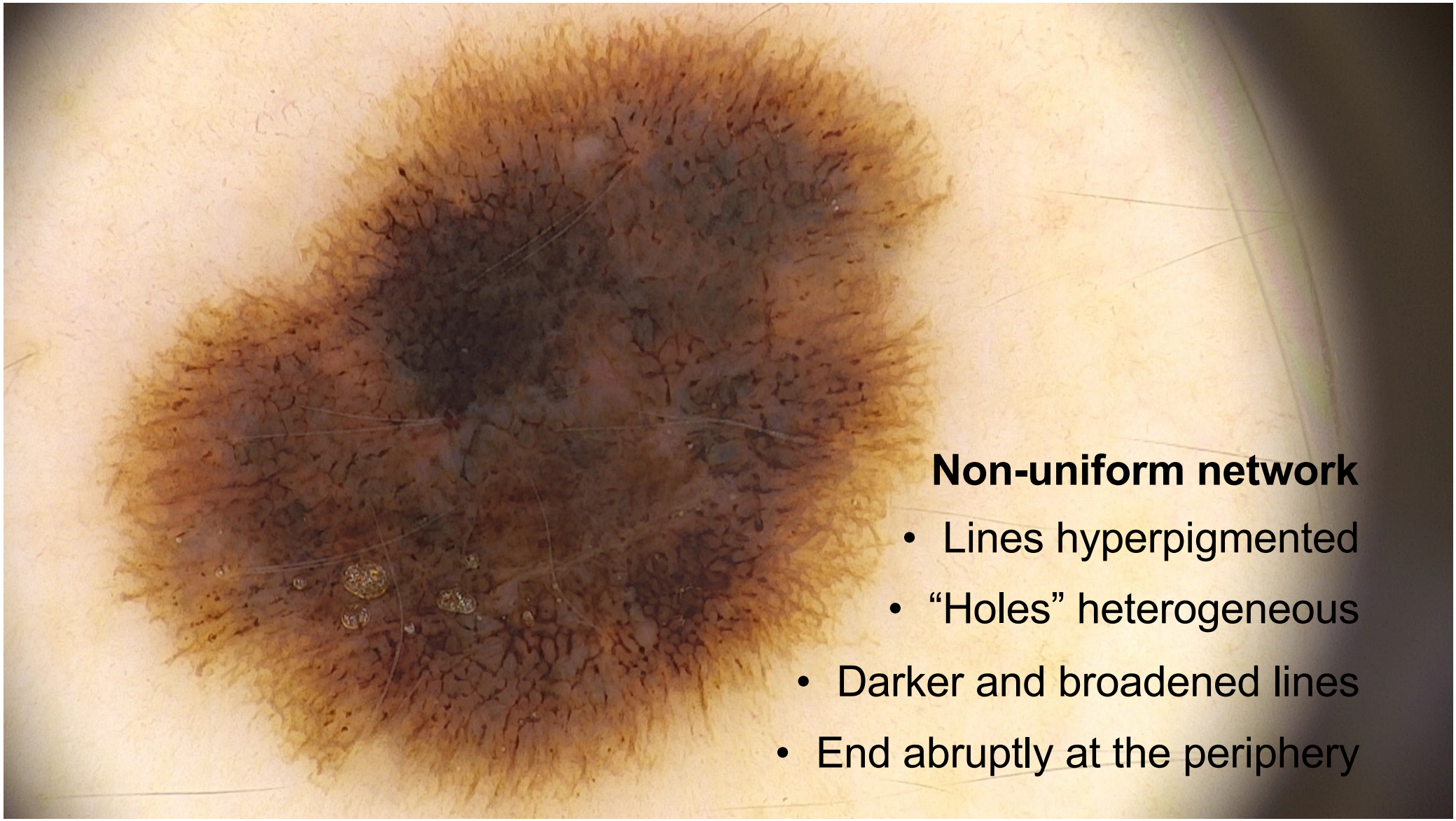


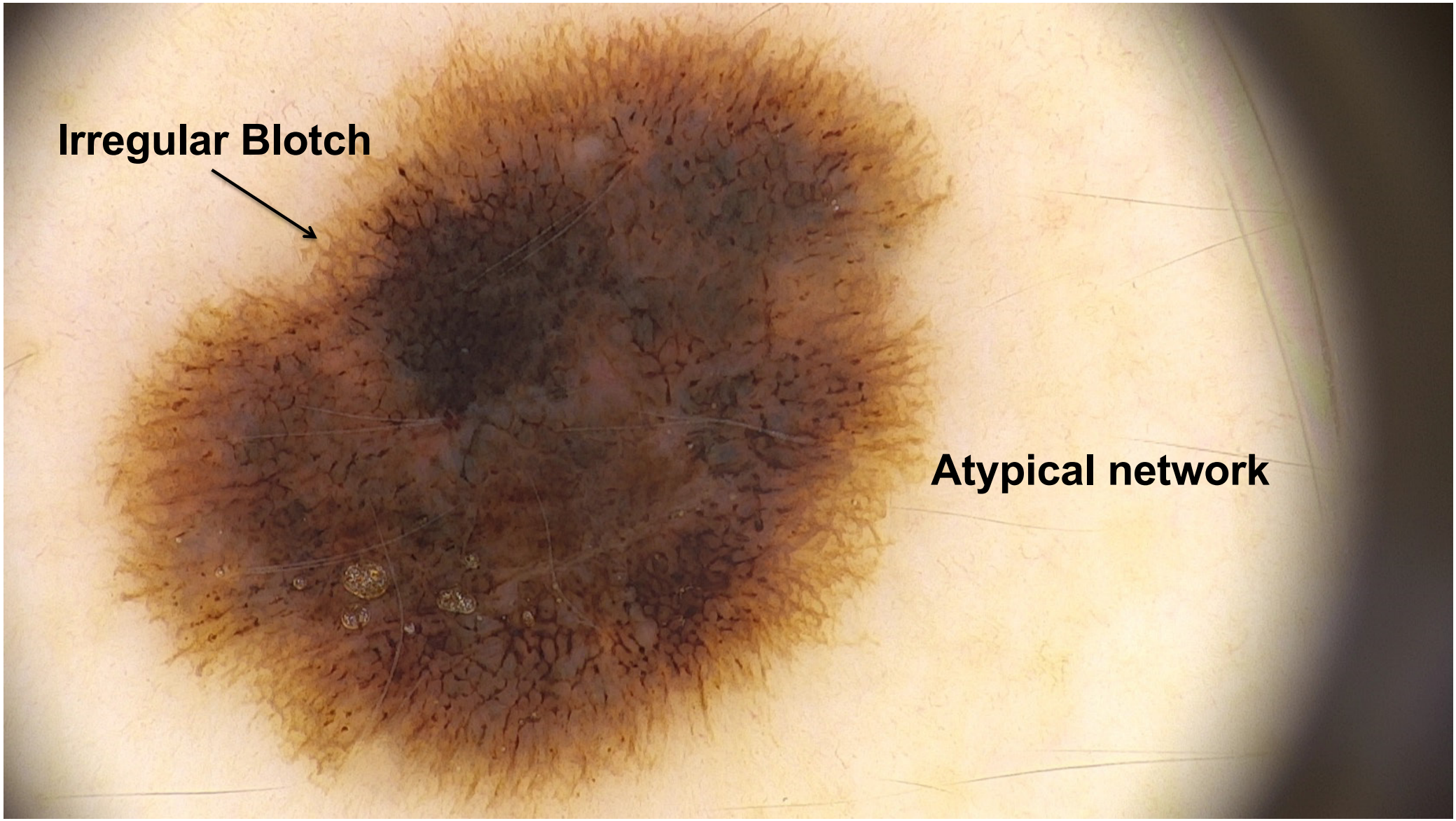
Figure 1. Progression model of superficial spreading melanoma. A, Step 1 showing undulating dermoepidermal junction (DEJ) with preserved rete ridges that are infiltrated by confluent aggregates of melanoma cells. B, Step 2 showing a focus undergoing remodeling with flattening of the DEJ, associated with inflammation, angiogenesis, and fibroplasia. C, Step 3 showing an invasive tumor nodule arising adjacent to the area of remodeling.

Melanoma in situ


Melanoma 0.4mm


Melanoma in situ


Non-uniform network
• Lines hyperpigmented
• “Holes” heterogeneous
• Darker and broadened lines
• End abruptly at the periphery


Irregular Blotch
Atypical network

Atypical Network

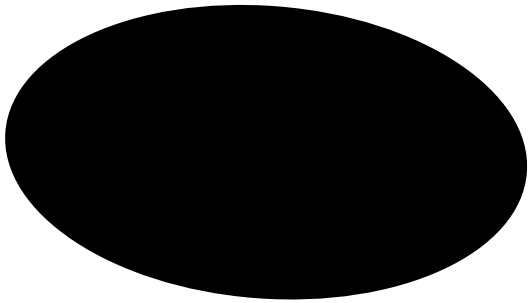
Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

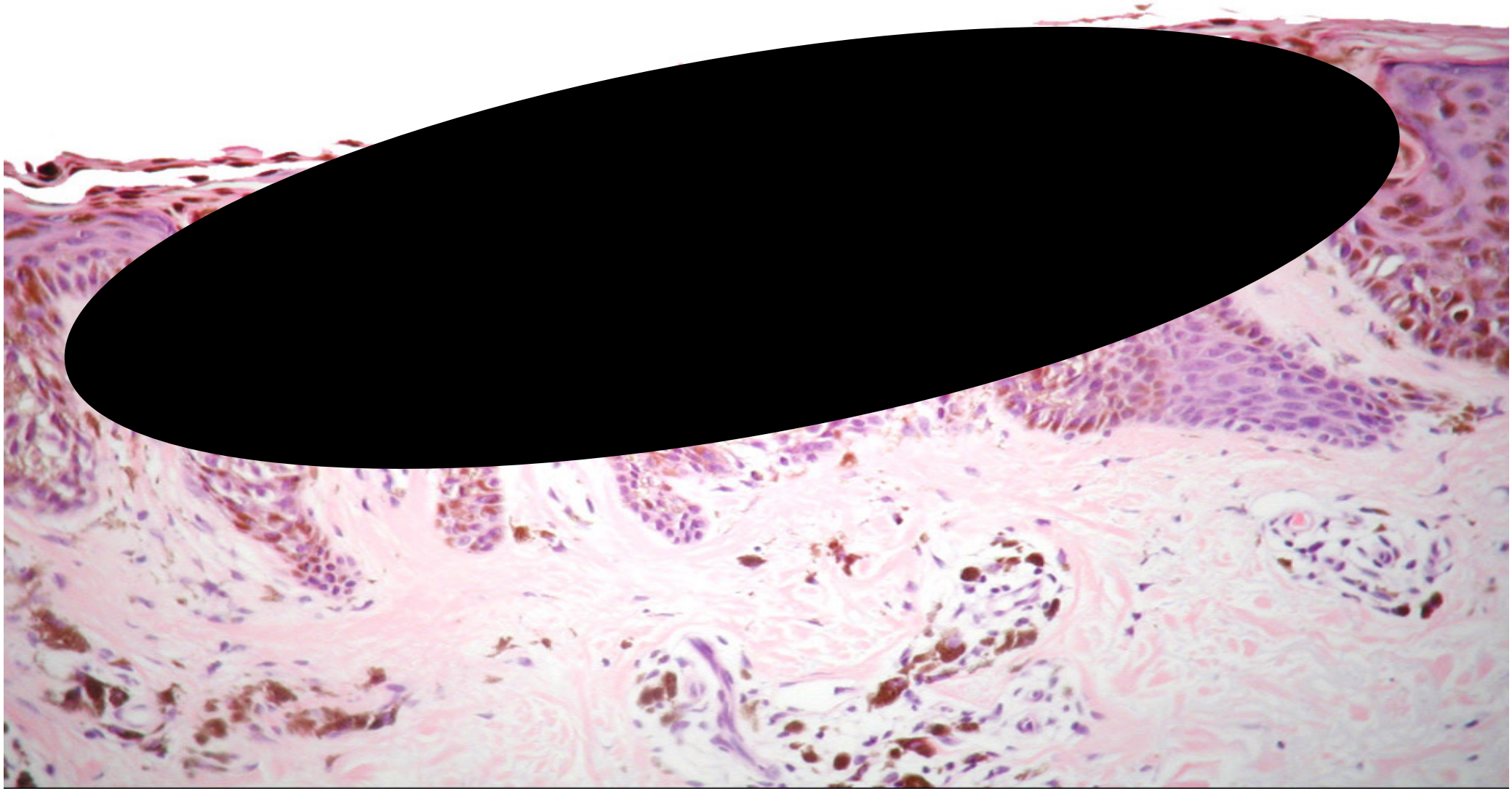
Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Irregular pigmentation	5 (1226)	62.3 (31.2-85.8)	78.6 (57.6-90.8)	6.4 (2.0-20.5)	87.9
Blue-white veil	17 (10 128)	60.6 (46.7-72.9)	79.7 (71.8-85.9)	6.3 (3.7-10.7)	89.0
Atypical network	19 (11 787)	56.8 (43.6-69.2)	71.8 (59.9-81.3)	3.3 (2.4-4.5)	83.8
Multicomponent pattern	9 (12 299)	53.7 (40.4-66.4)	82.4 (72.2-89.4)	5.6 (2.4-13.0)	96.6
Atypical dots and/or globules	17 (5497)	49.7 (37.8-61.8)	73.0 (61.8-81.9)	2.7 (1.8-4.1)	85.1

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

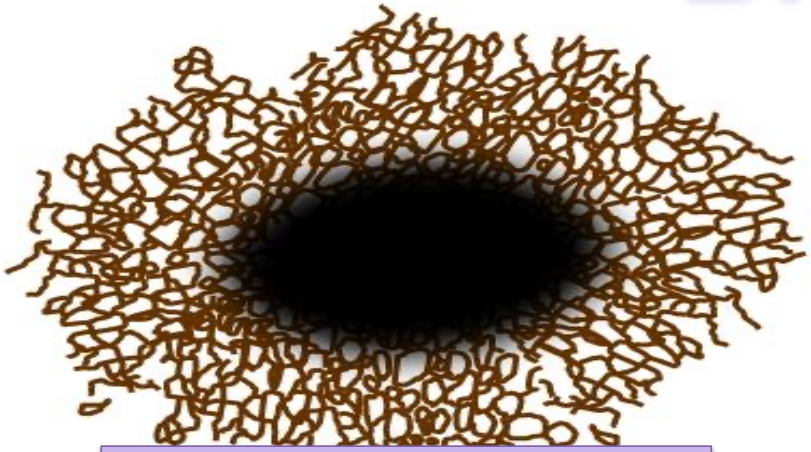
Blotch

- large concentration of melanin pigment
- throughout epidermis and/or dermis
- visually obscuring the ability to discern any other structures



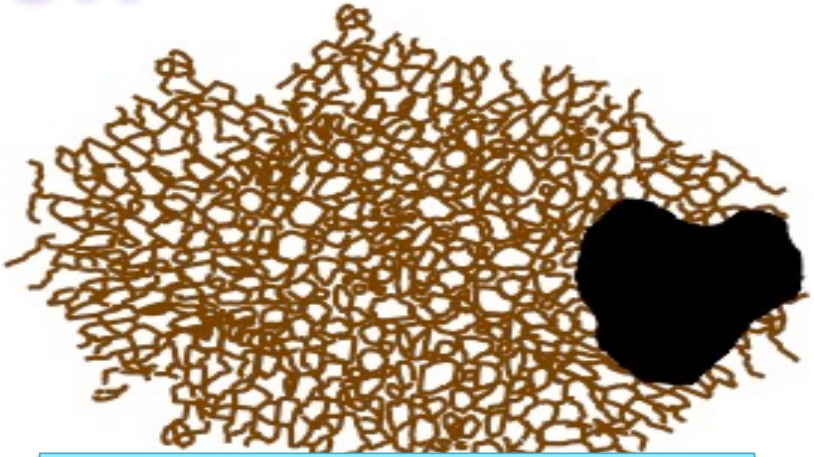


Blotch



Regular

- **One** centrally located homogeneous, symmetric, hyperpigmented blotch (lamella).



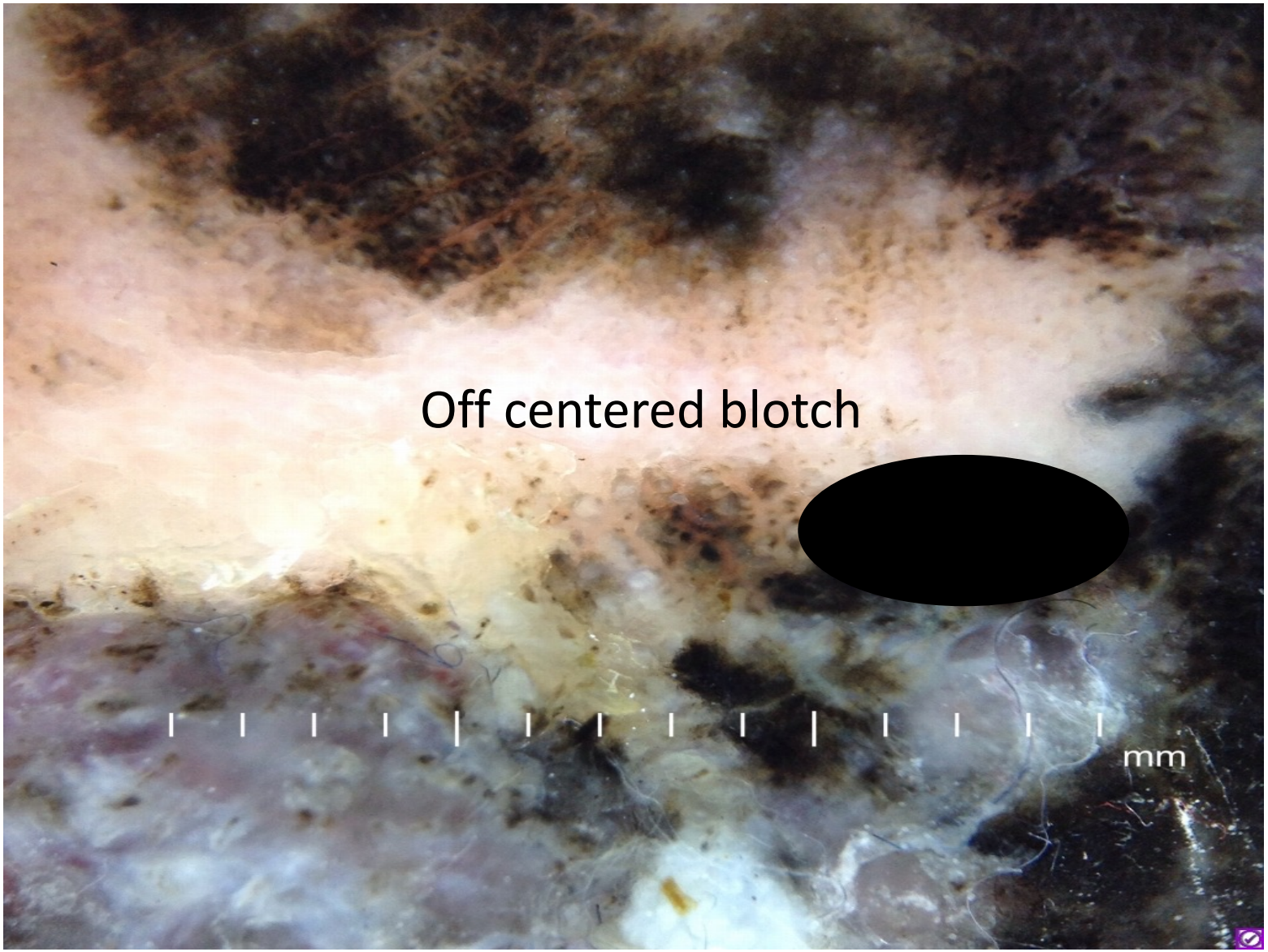
Irregular

- More than one blotch
- Off center blotch
- Irregular outline

- **One** central blotch

- **More than one** blotch
- **Off center** blotch
- Irregular outline

Tape stripping off the stratum corneum


Off centered blotch
mm

Off-center blotch

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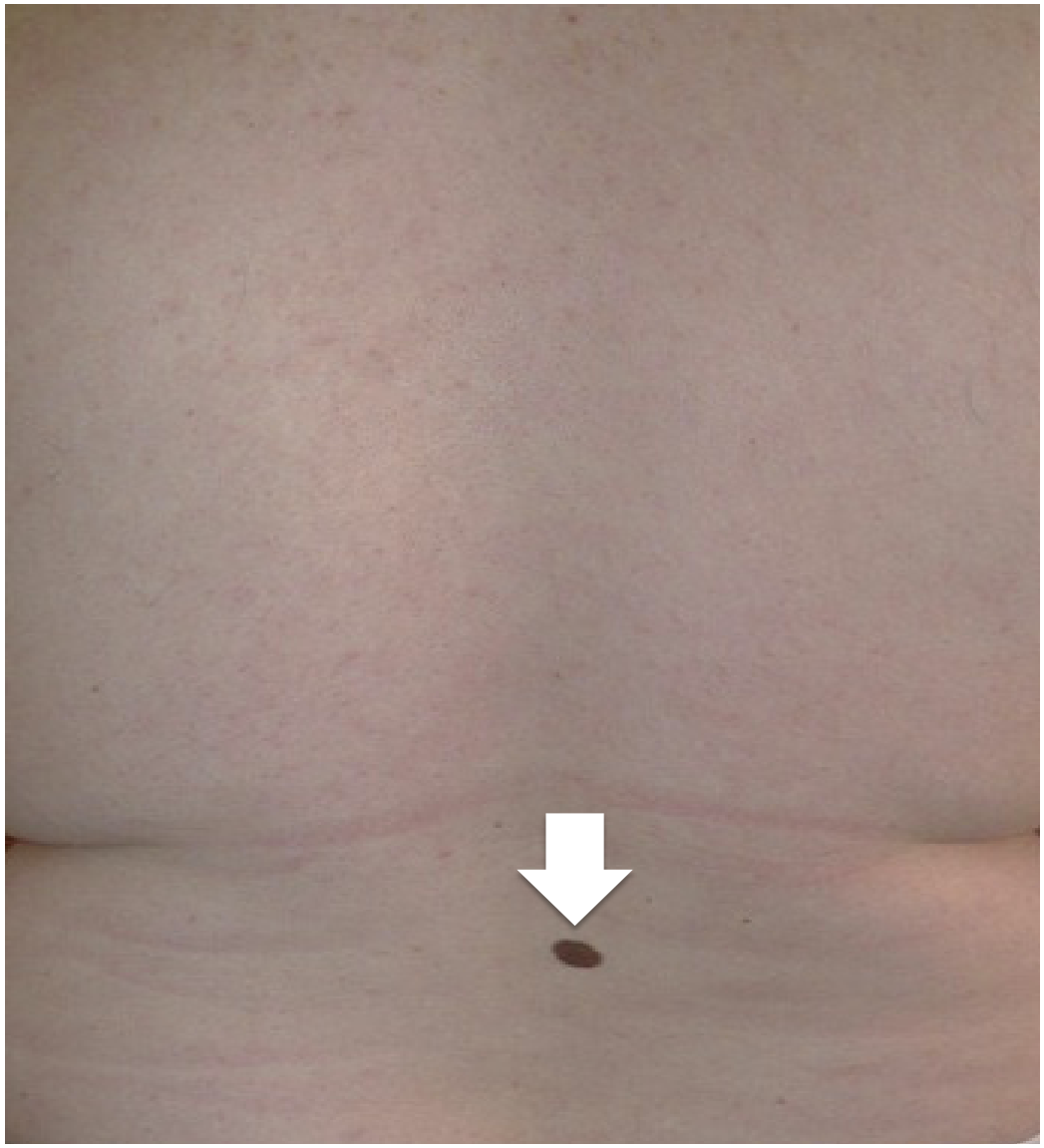
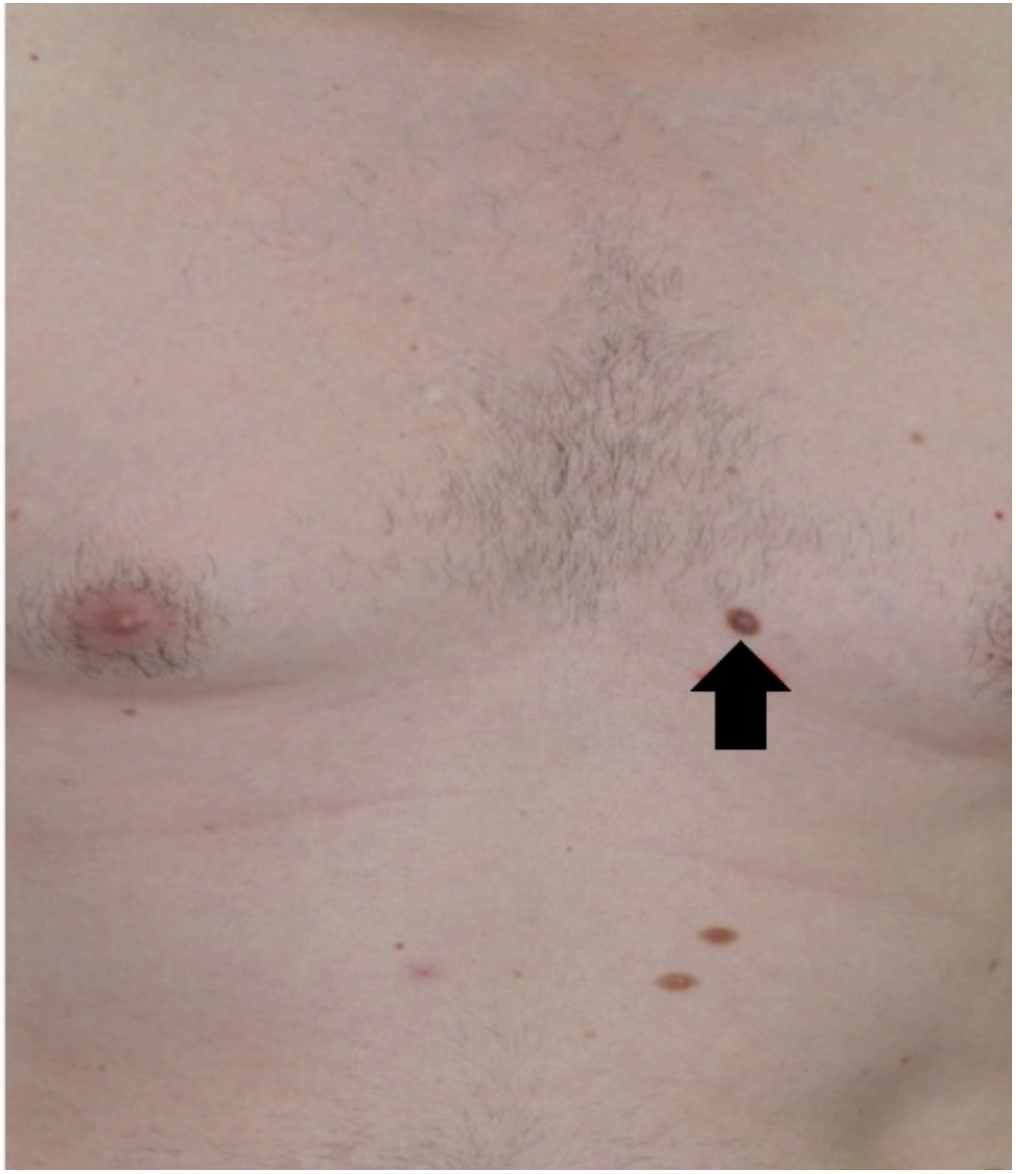
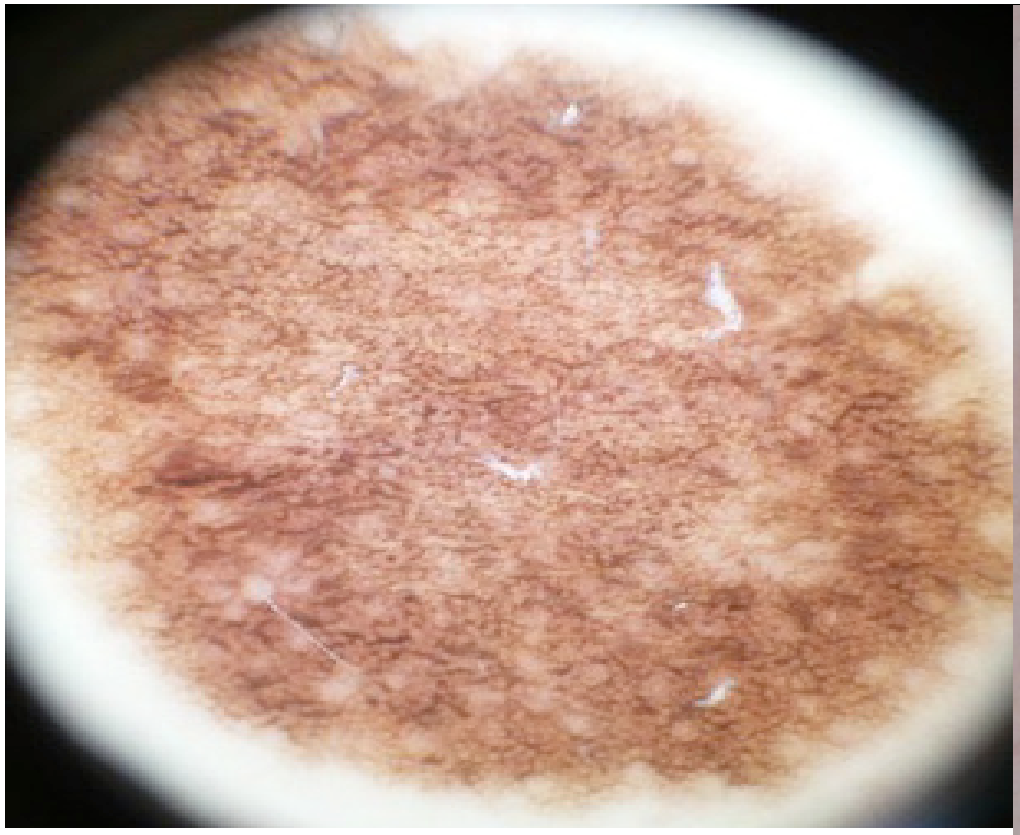
Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Regression	17 (10 542)	48.1 (32.1-64.5)	83.6 (69.7-91.9)	4.6 (3.0-6.9)	84.8
Regression and peppering	21 (11 739)	44.9 (32.0-58.4)	86.5 (77.3-92.4)	4.7 (3.3-6.8)	88.7
Off-center blotch	16 (12 850)	42.1 (29.6-55.6)	84.1 (74.6-90.5)	3.8 (2.7-5.5)	85.8
Peripheral tan structureless area	12 (8285)	37.5 (22.3-55.7)	76.1 (65.6-84.2)	2.0 (1.3-3.0)	50.4
Peppering	7 (7112)	36.8 (19.1-58.9)	93.4 (81.9-97.8)	6.3 (2.4-16.1)	91.6
Negative network	8 (7011)	34.5 (30.5-38.7)	70.8 (47.0-86.8)	1.3 (0.7-2.4)	79.2
Scarlike areas	8 (7328)	31.3 (16.9-50.5)	89.1 (83.7-92.9)	4.4 (2.7-7.2)	76.0
Shiny white structures	9 (9687)	30.5 (15.8-50.7)	93.6 (85.6-97.3)	6.7 (2.5-17.9)	95.2

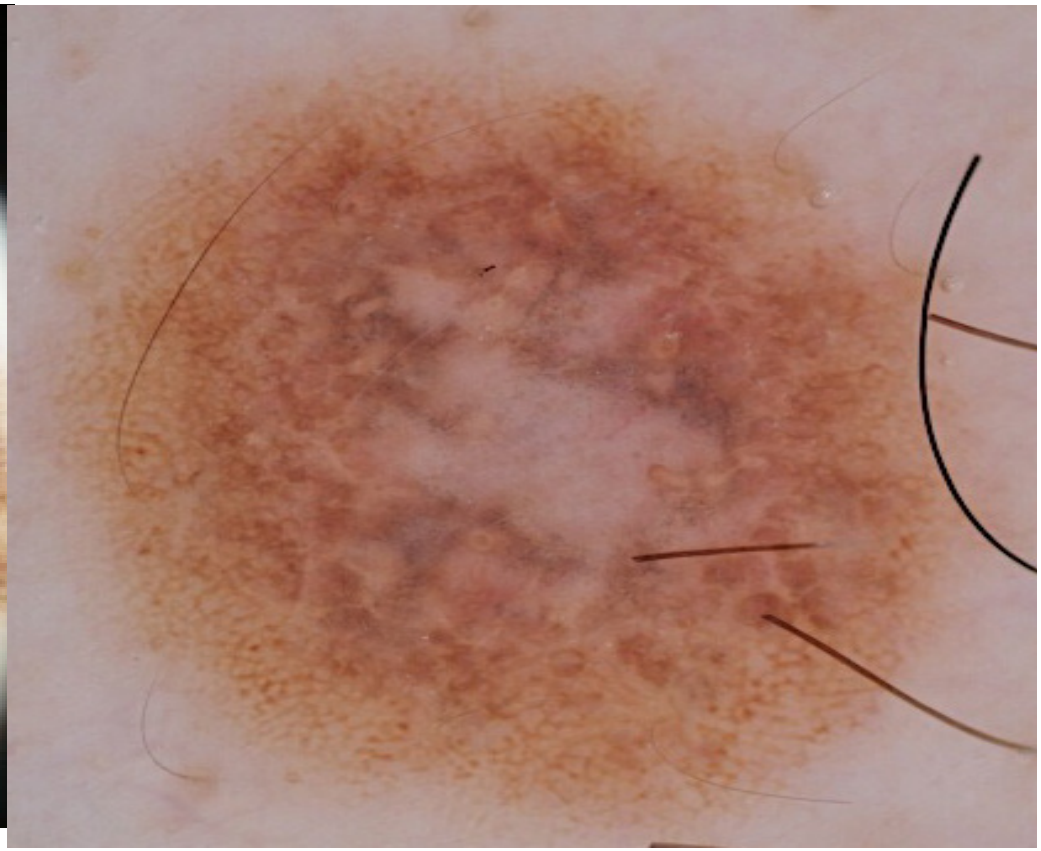
Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

case

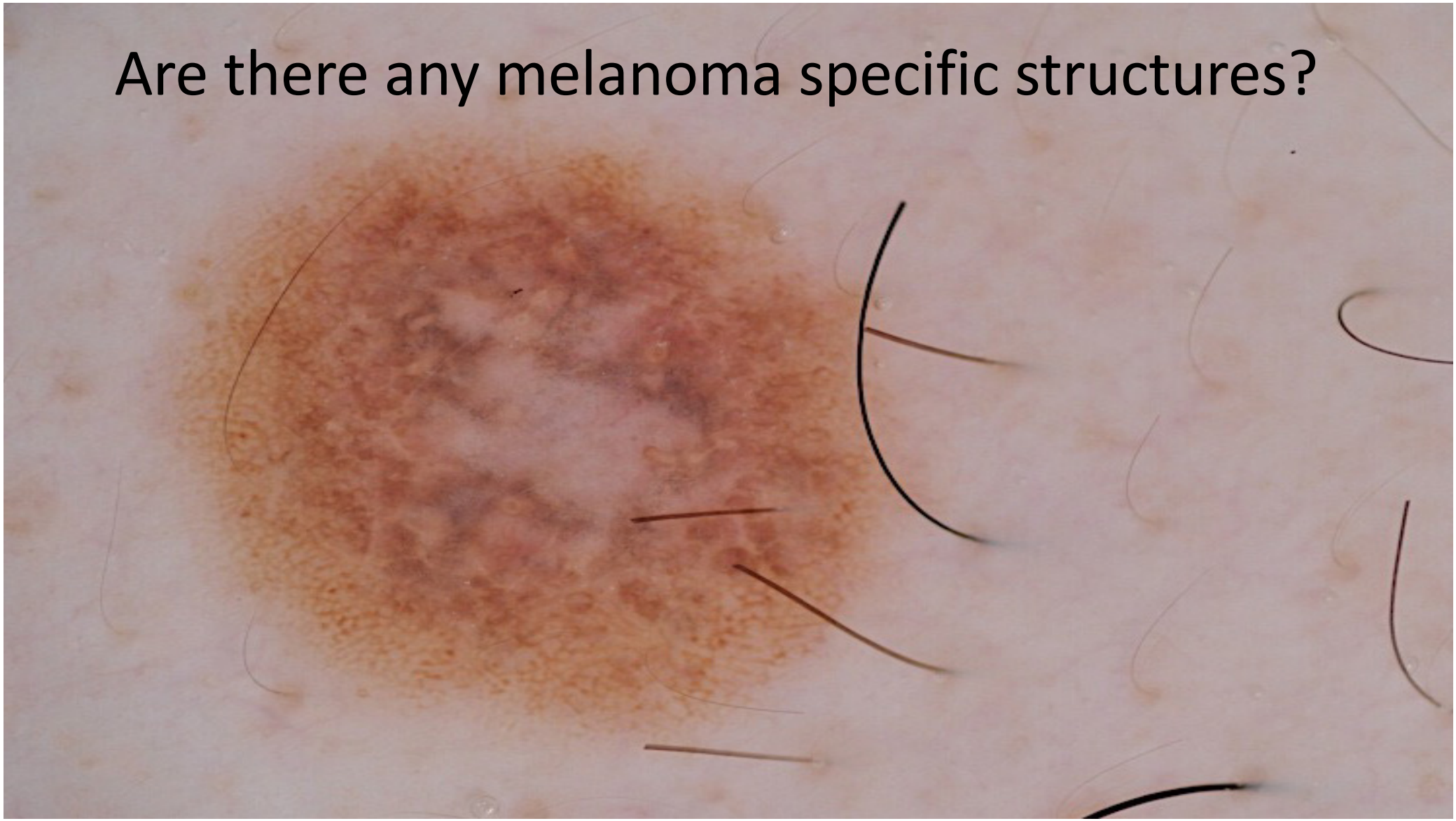






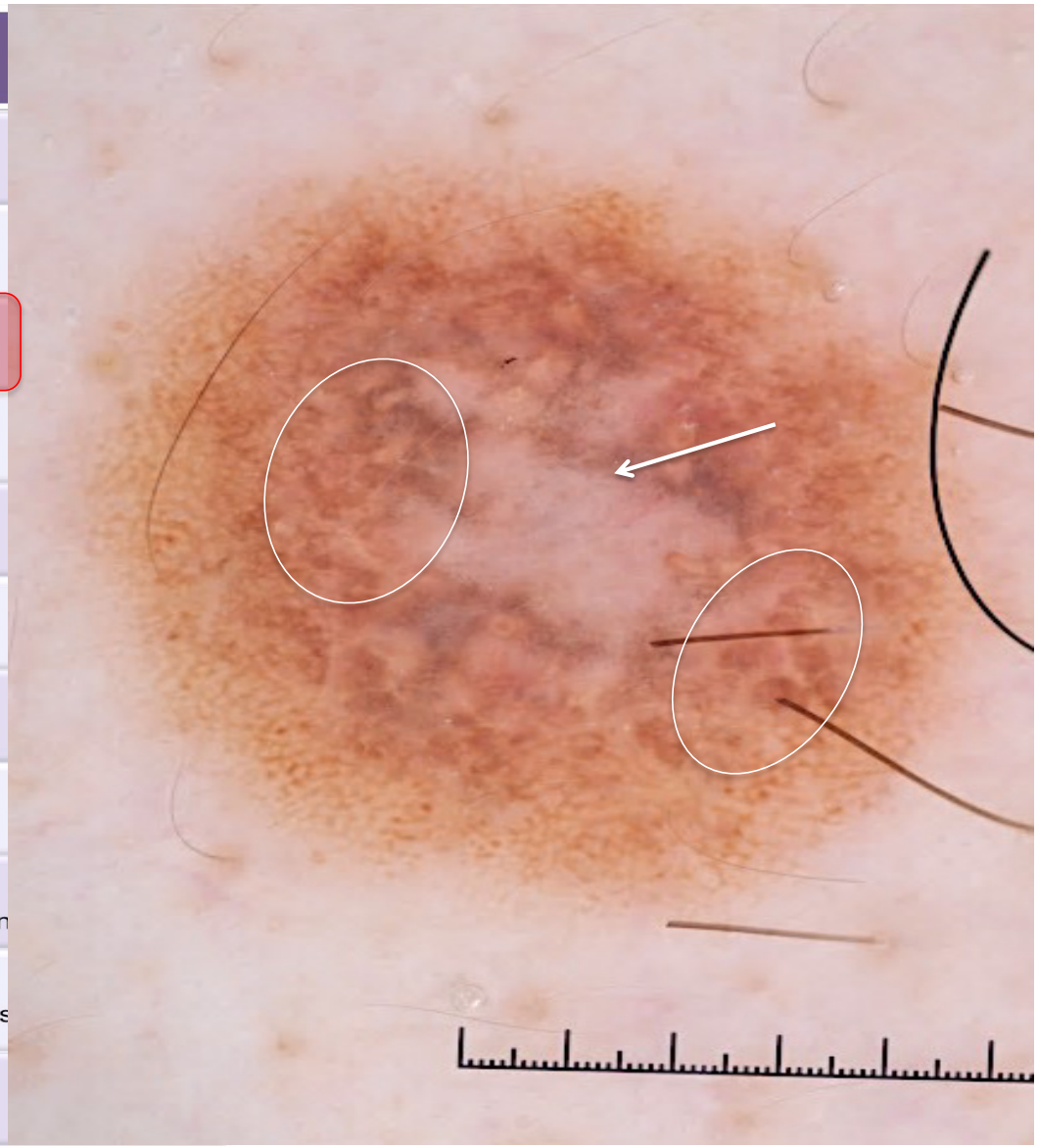


Are there any melanoma specific structures?



Melanoma Specific Structures

- **Atypical network**
- **Streaks** (pseudopods and radial streaming)
- **Negative pigment network** Maybe
- **Shiny white lines** (Crystalline structures)
- **Atypical dots and/or globules**
- **Off-centered blotch**
- **Peripheral tan structureless areas**
- **Blue-white veil overlying raised areas**
- **Regression structures**
  - Blue-white veil overlying macular areas, scar-like areas ar
- **Atypical vascular structures**
  - Dotted vessels, serpentine vessels, polymorphous vessels areas, red globules, corkscrew vessels
- **Polygonal structures (zig-zag lines)**



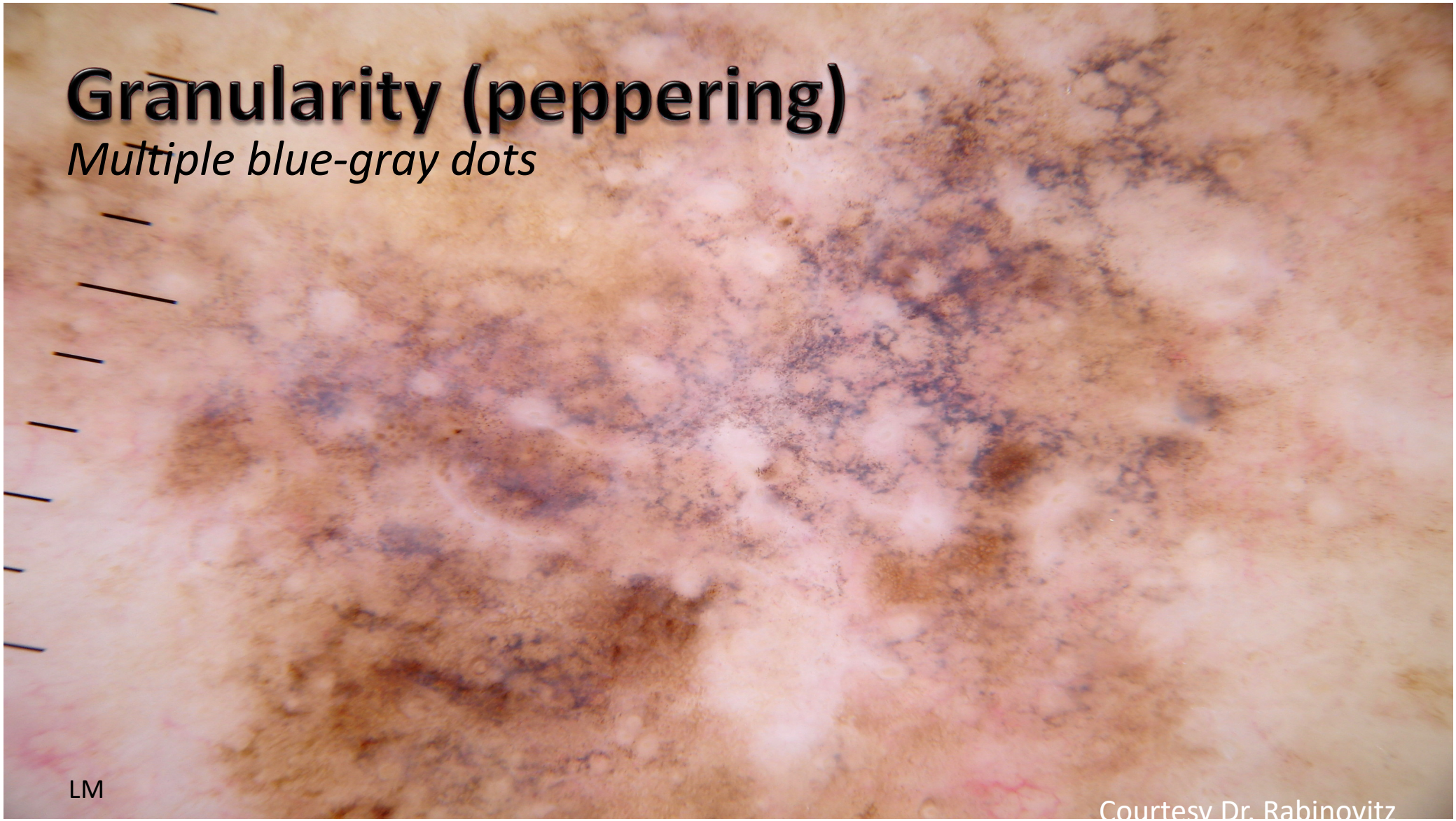
Regression Structures

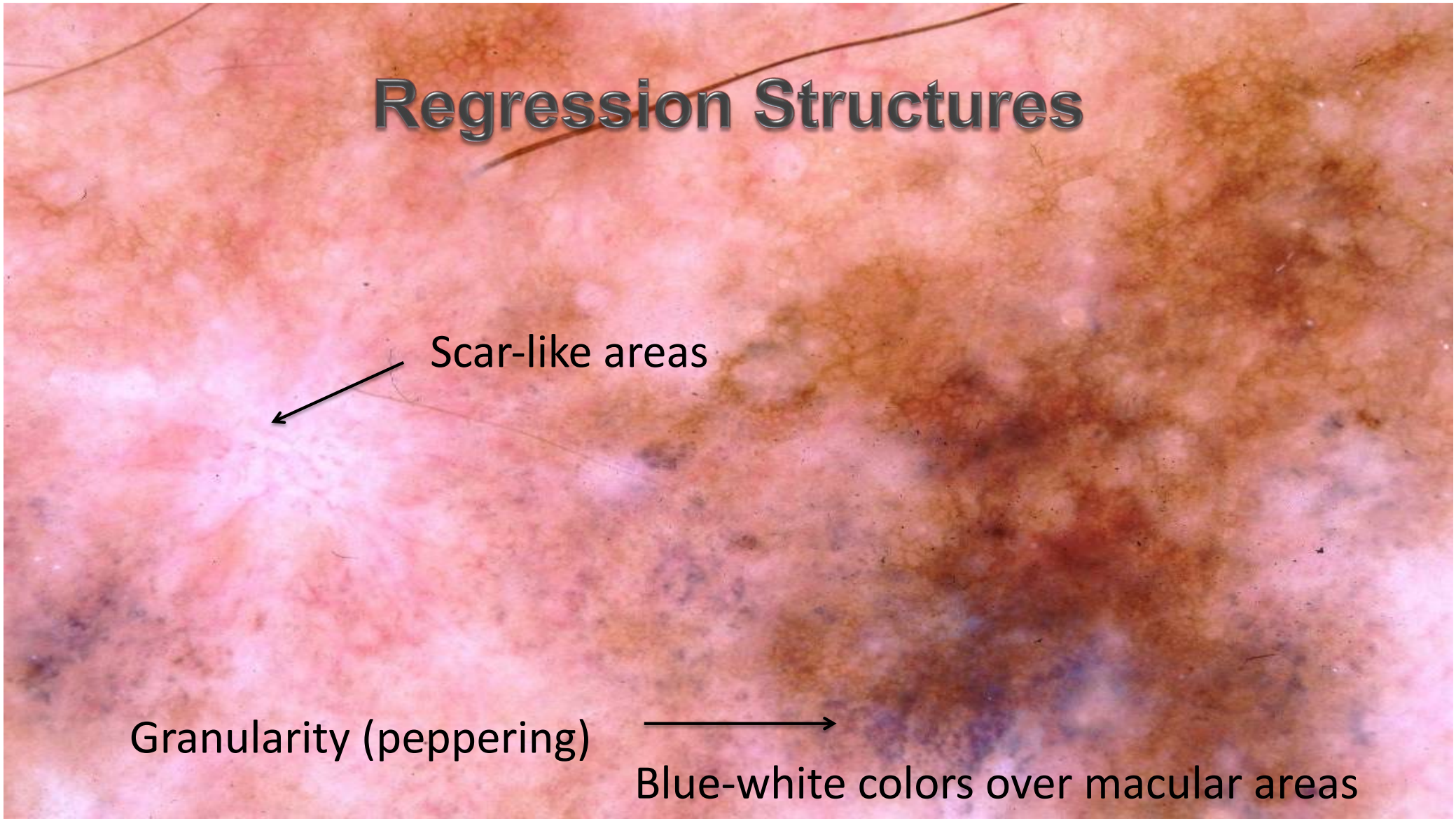
Scar-like areas + granularity = Regression structures

Regression Structures

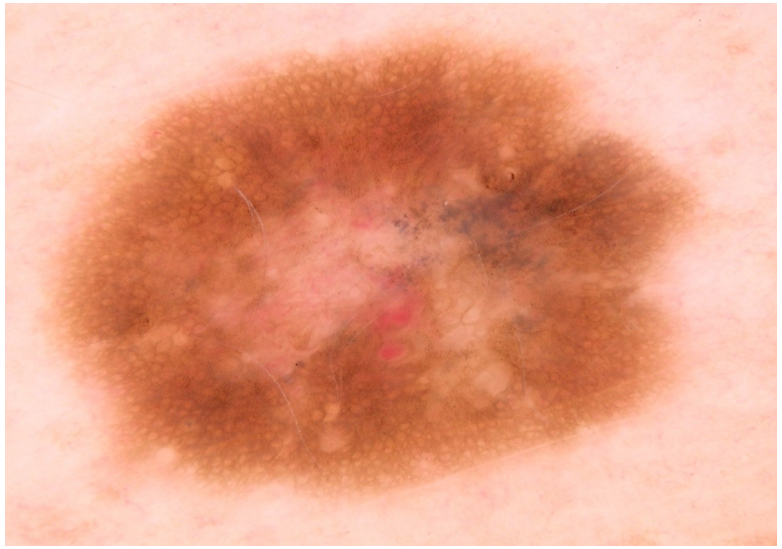
Granularity (Peppering)

Scar-like area


Granularity (peppering)
Multiple blue-gray dots
LM
Courtesy Dr. Rabinovitz

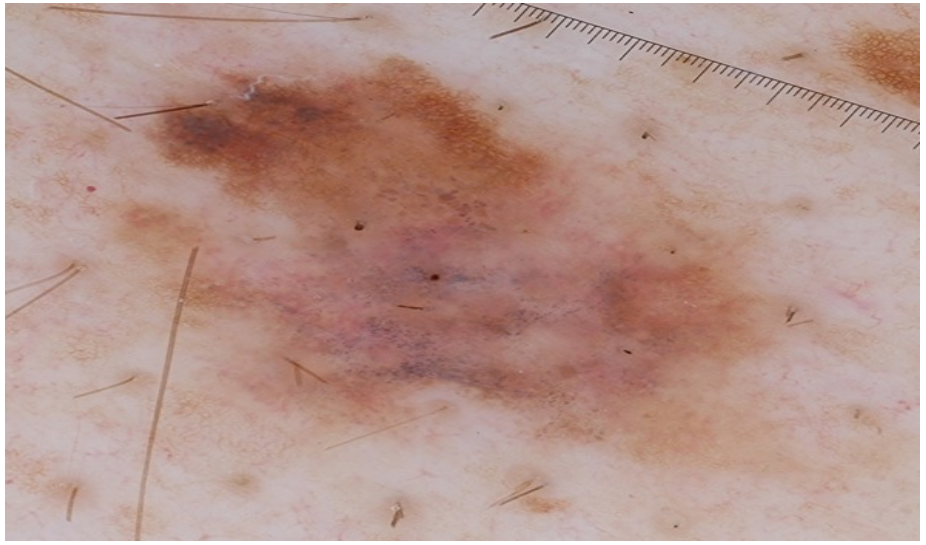

Regression Structures
Scar-like areas
Granularity (peppering)
Blue-white colors over macular areas

Regression Structures



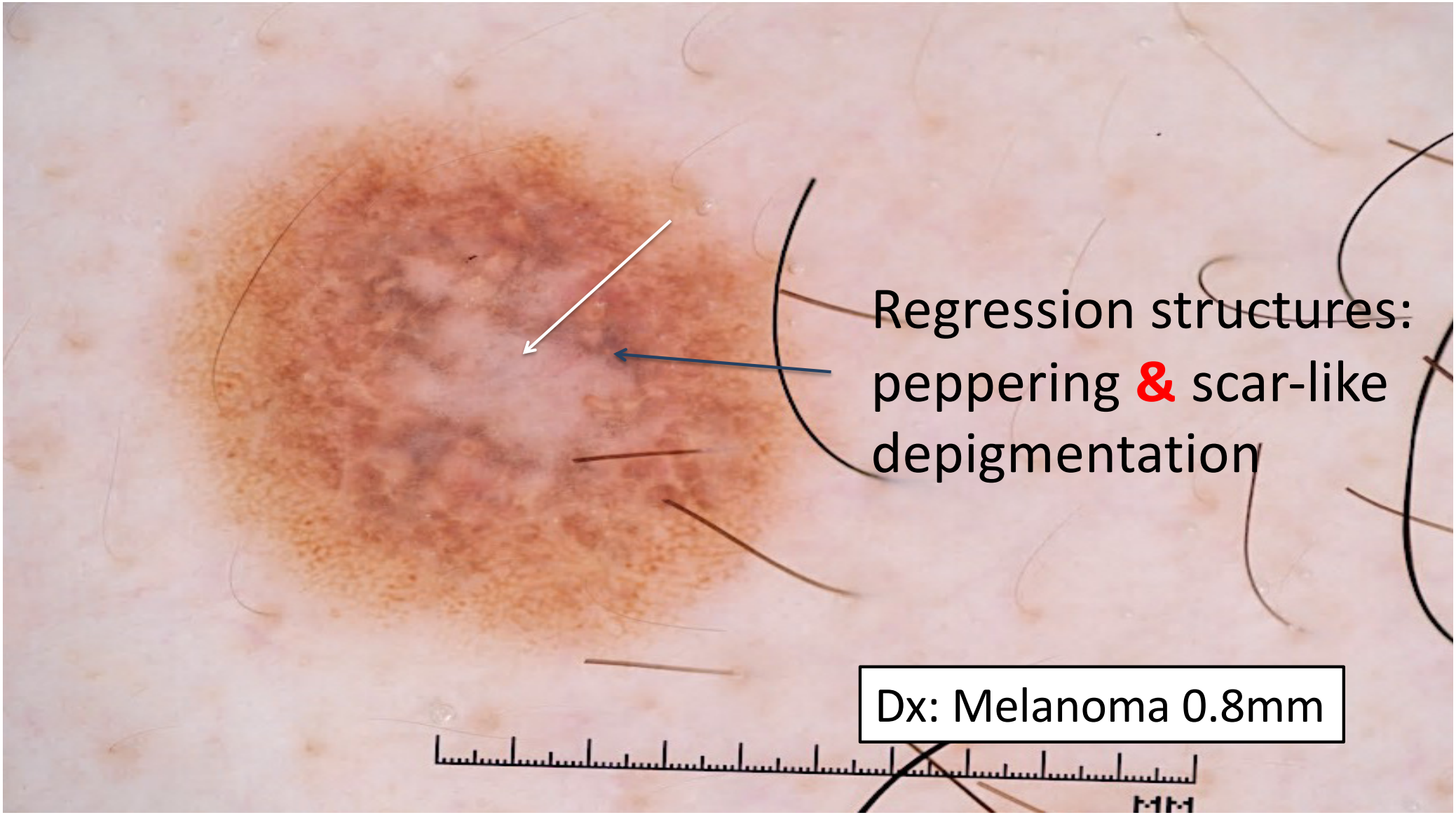
- Peppering (uncommon to scarring)
- <10% of lesion

Nevus



- Peppering +/- scarring
- >50% of lesion area.

Melanoma


Regression structures: peppering & scar-like depigmentation
Dx: Melanoma 0.8mm

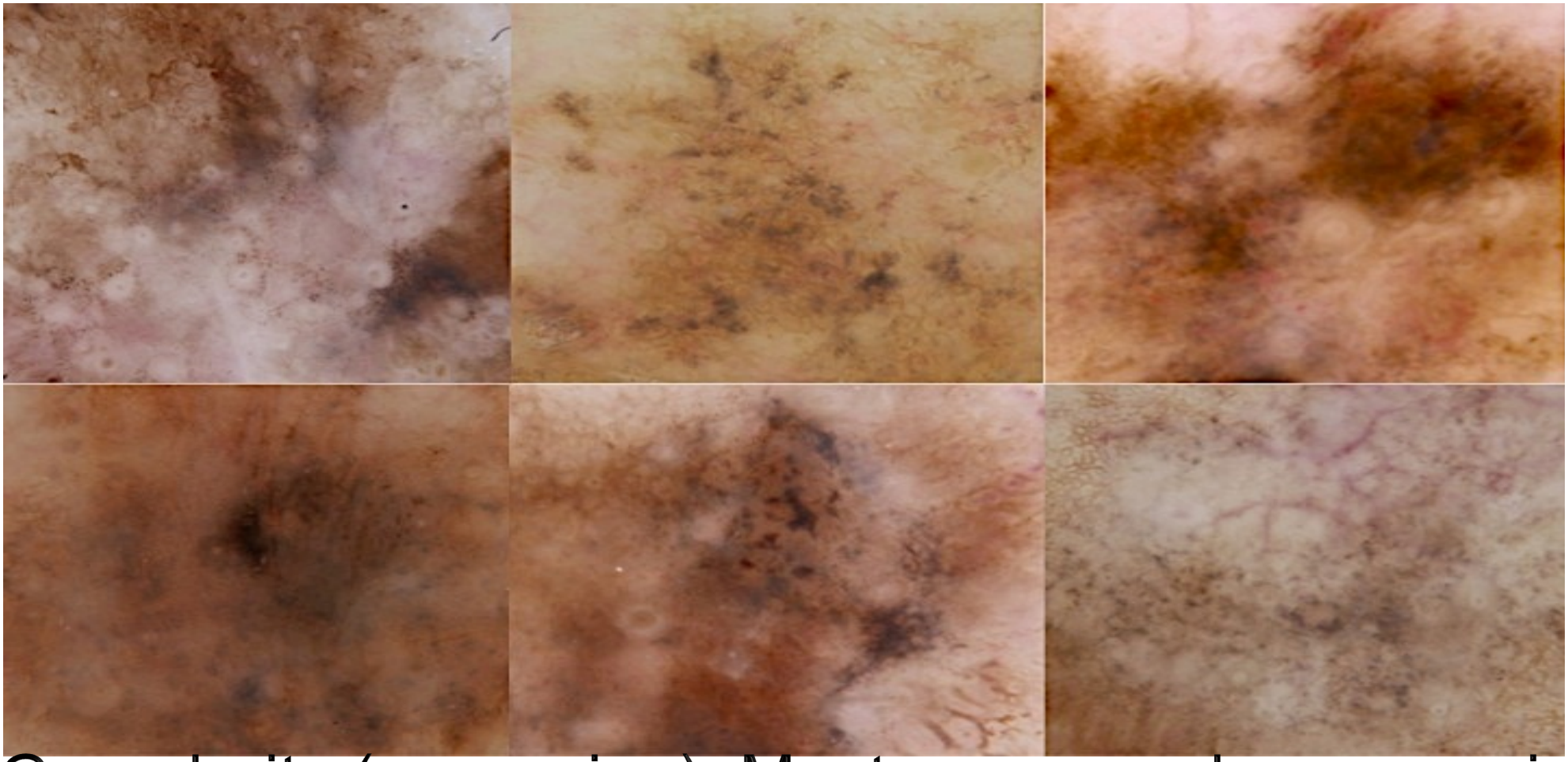
Does granularity correlate thickness?

Similar in both, *in situ* and invasive melanomas

Br J Dermatol 2010;163:302-9.

More in high-grade dysplastic nevi, *in situ*, early invasive melanomas, and sun-damaged skin

Br J Dermatol 2007;157:907-13.



Granularity (peppering): Most common dermoscopic structure in MM on non-Facial CSDS

Regression Structures

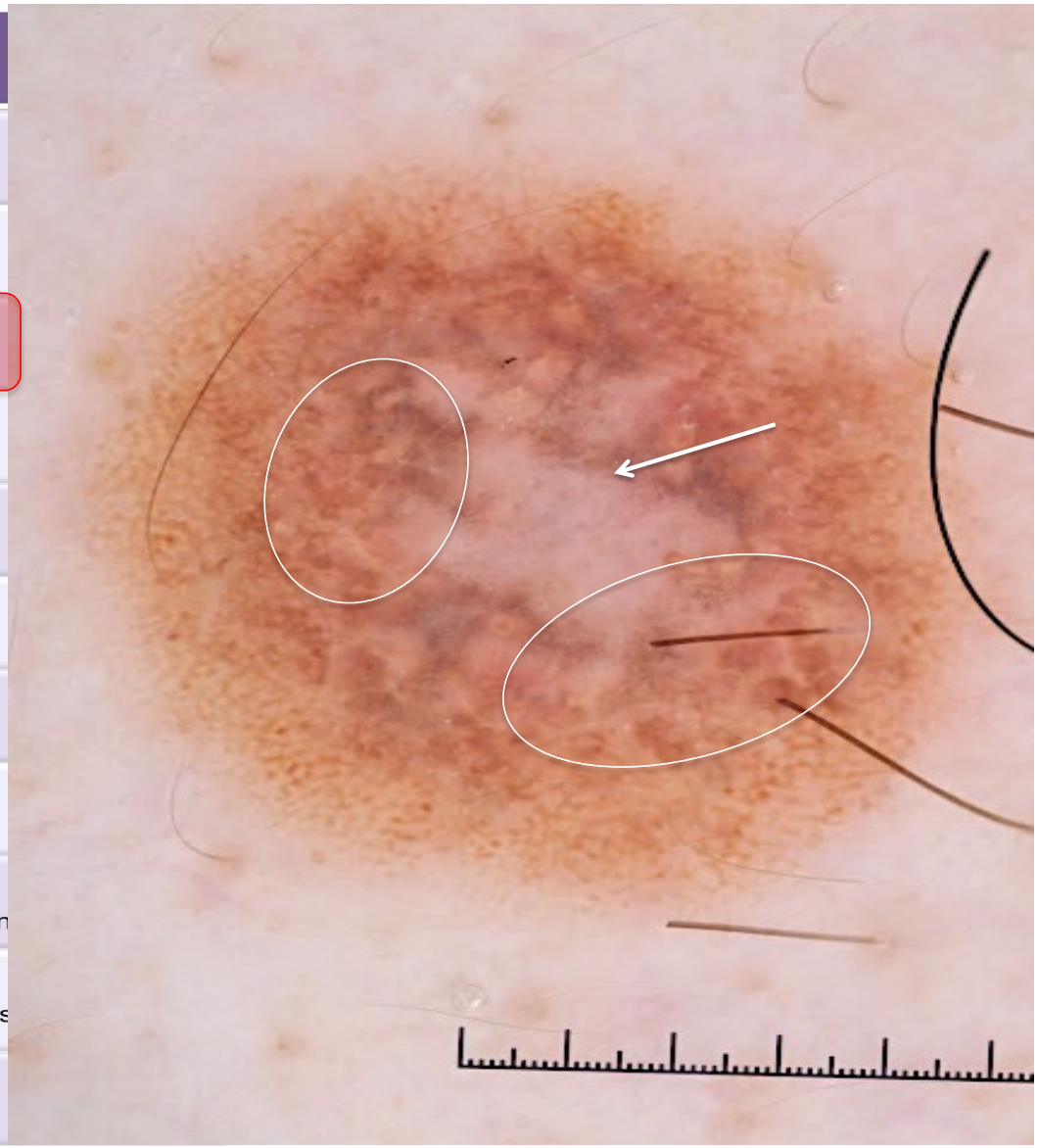
Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Regression	17 (10 542)	48.1 (32.1-64.5)	83.6 (69.7-91.9)	4.6 (3.0-6.9)	84.8
Regression and peppering	21 (11 739)	44.9 (32.0-58.4)	86.5 (77.3-92.4)	4.7 (3.3-6.8)	88.7
Off-center blotch	16 (12 850)	42.1 (29.6-55.6)	84.1 (74.6-90.5)	3.8 (2.7-5.5)	85.8
Peripheral tan structureless area	12 (8285)	37.5 (22.3-55.7)	76.1 (65.6-84.2)	2.0 (1.3-3.0)	50.4
Peppering	7 (7112)	36.8 (19.1-58.9)	93.4 (81.9-97.8)	6.3 (2.4-16.1)	91.6
Negative network	8 (7011)	34.5 (30.5-38.7)	70.8 (47.0-86.8)	1.3 (0.7-2.4)	79.2
Scarlike areas	8 (7328)	31.3 (16.9-50.5)	89.1 (83.7-92.9)	4.4 (2.7-7.2)	76.0
Shiny white structures	9 (9687)	30.5 (15.8-50.7)	93.6 (85.6-97.3)	6.7 (2.5-17.9)	95.2

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

Melanoma Specific Structures

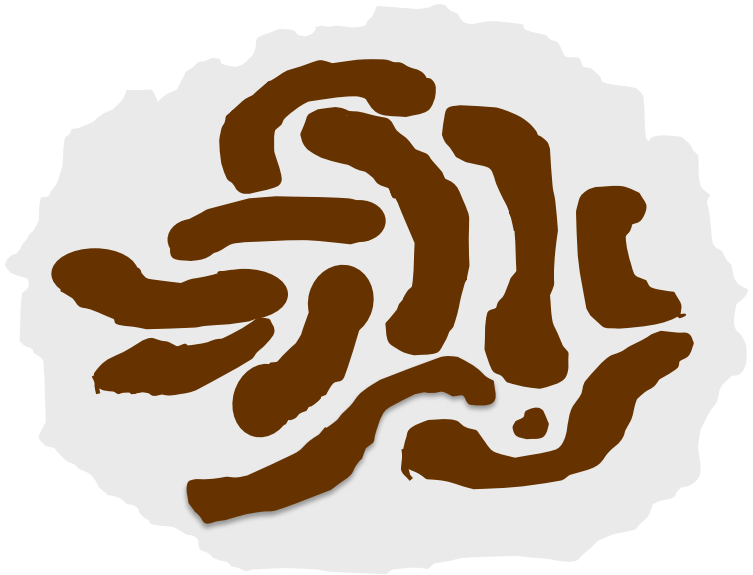
- **Atypical network**
- **Streaks** (pseudopods and radial streaming)
- **Negative pigment network** Maybe
- **Shiny white lines** (Crystalline structures)
- **Atypical dots and/or globules**
- **Off-centered blotch**
- **Peripheral tan structureless areas**
- **Blue-white veil overlying raised areas**
- **Regression structures**
  - Blue-white veil overlying macular areas, scar-like areas ar
- **Atypical vascular structures**
  - Dotted vessels, serpentine vessels, polymorphous vessels areas, red globules, corkscrew vessels
- **Polygonal structures (zig-zag lines)**



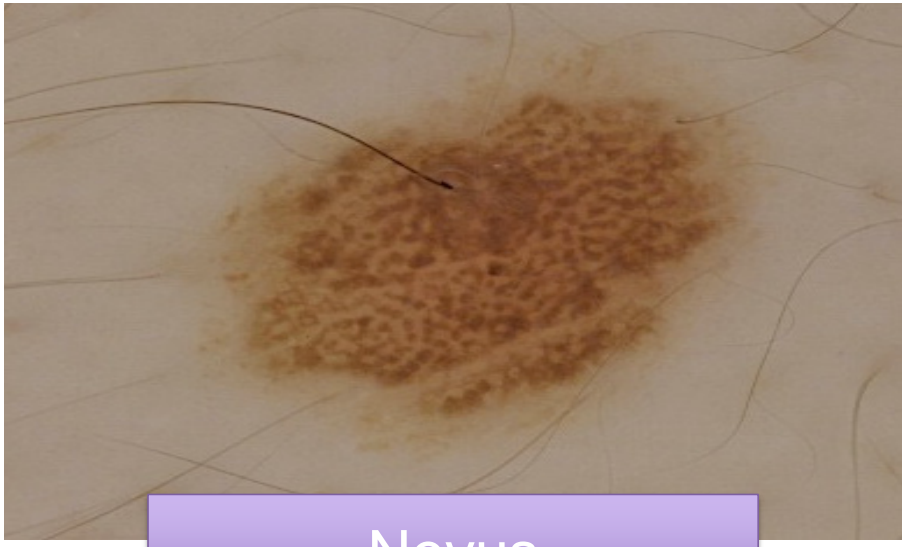
Negative Network

Negative Network

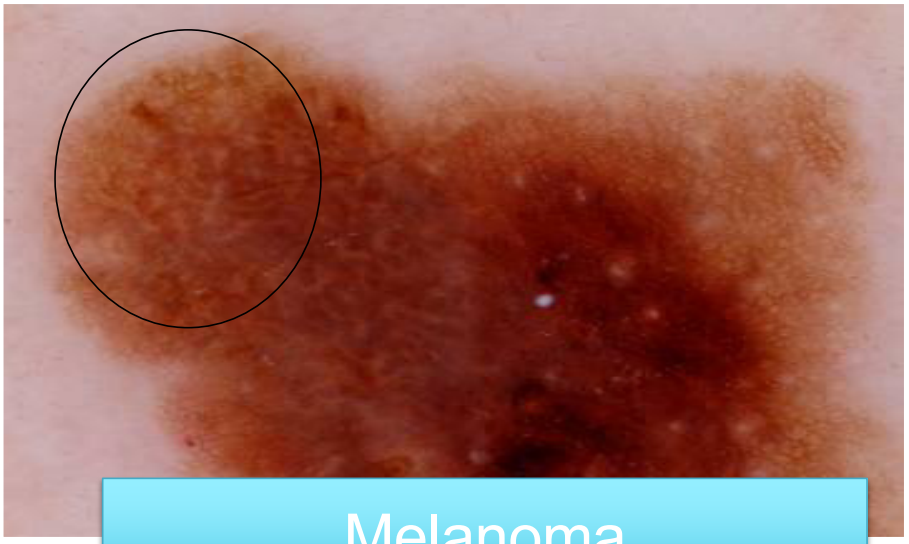
- Serpiginous interconnecting hypo-pigmented lines that surround irregularly shaped pigmented structures, which resemble elongated and curvilinear globules
- It can be seen with & w/o polarized light



Negative Network



Nevus

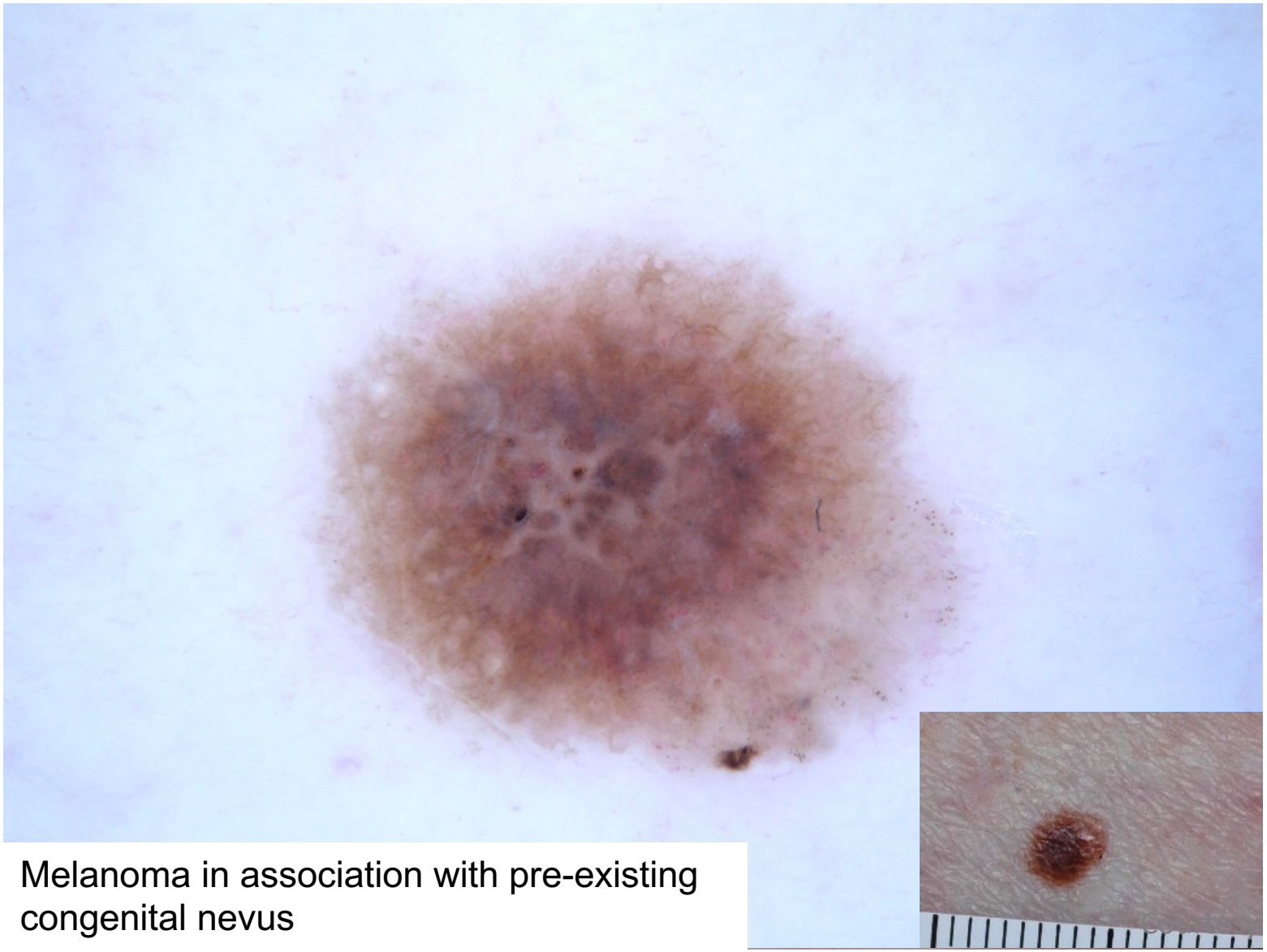


Melanoma

- Commonly seen in Spitz. Usually ordered distribution but not always
- Rarely seen in CMN & DN.

- Focally, asymmetric distribution but can also be distributed in an organized manner.

Courtesy Dr. Rabinovitz



Melanoma in association with pre-existing congenital nevus

Dr. Rabinovitz

Melanomas in association with nevi on intermittent sun exposure

- Atypical network
- Irregular streaks (pseudopod &/or radial streaming
- Negative pigment network
- Shiny white structures (Crystalline/chrysalis) only with PD
- Globules irregularly distributed
- Irregular blotch
- Blue-white veil over raised areas
- Regression structures (gray dots/granules, peppering)
- Atypical vascular structures
- Peripheral tan/brown structureless areas

Nevus-Associated Melanomas

- 30% of all melanomas
- younger age
- thinner Breslow thickness.
- greater likelihood of being present on the torso.

Negative pigment network (2.5x)

Reiter et al. JEADV 2021

Nevus-Associated Melanomas

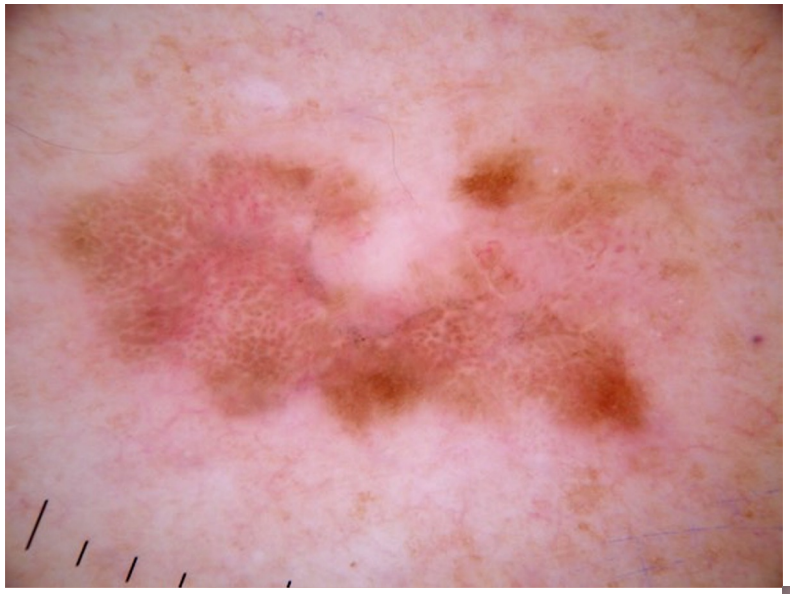
in situ melanomas

- Tan structureless areas (2x)
- Network

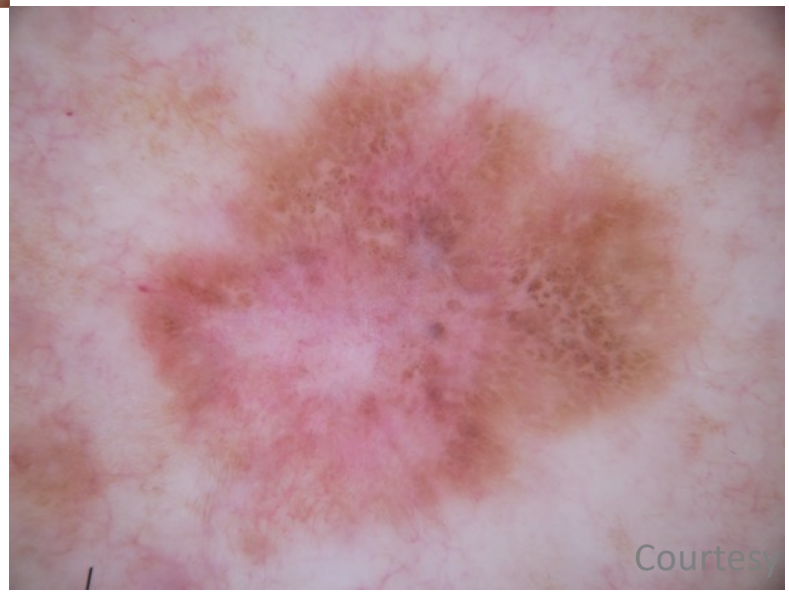
invasive melanomas

- scar-like depigmentation
- shiny white structures.

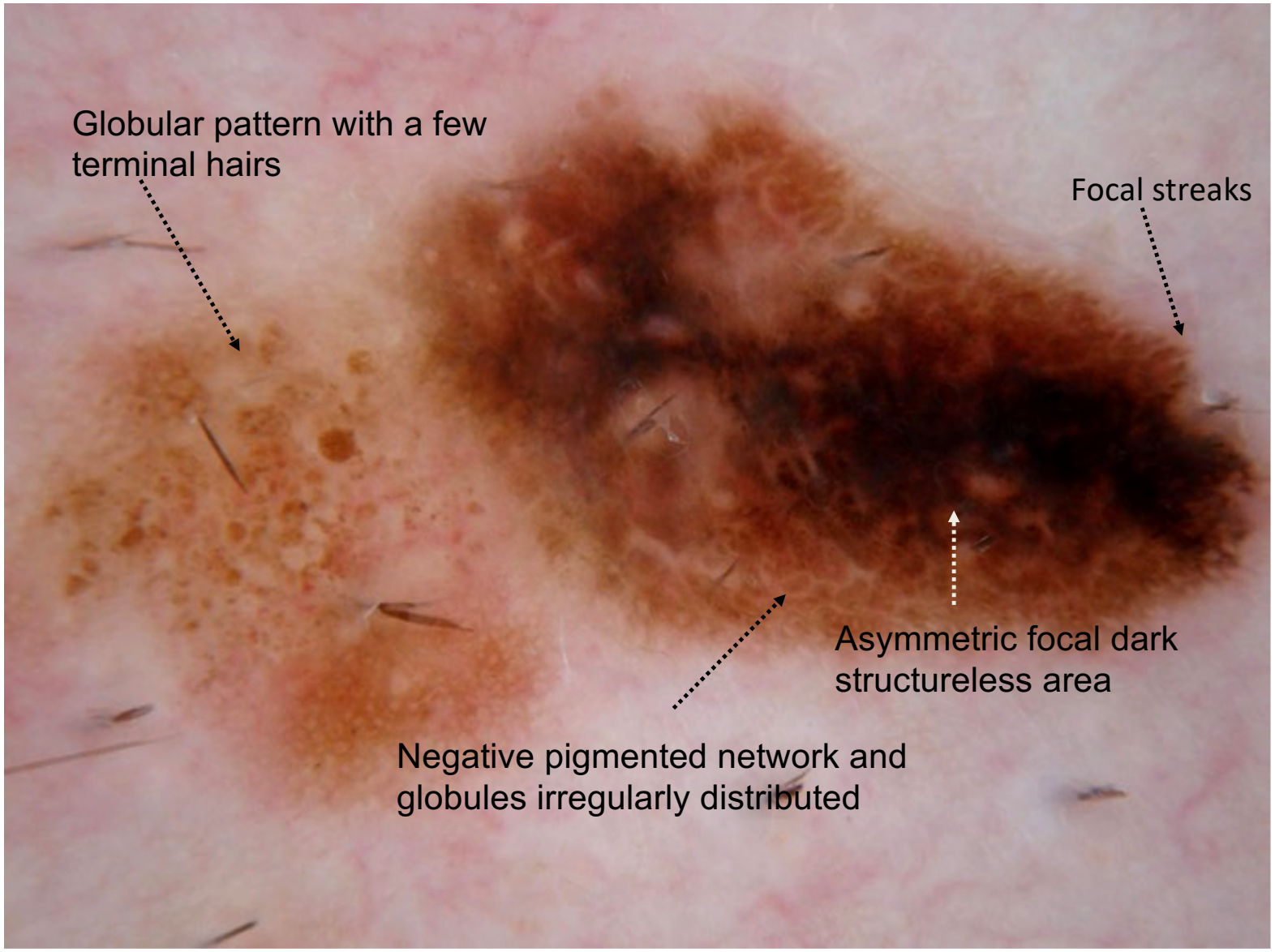
Reiter et al. JEADV 2021



Melanoma in association with congenital nevi



Courtesy Dr. Rabinovitz



Courtesy Dr. Rabinovitz

Negative network is associated with melanomas arising in nevus

Shitara D et al Acta Derm Venereol 2015
Reiter O, et al. JEADV 2021

Negative Network

Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

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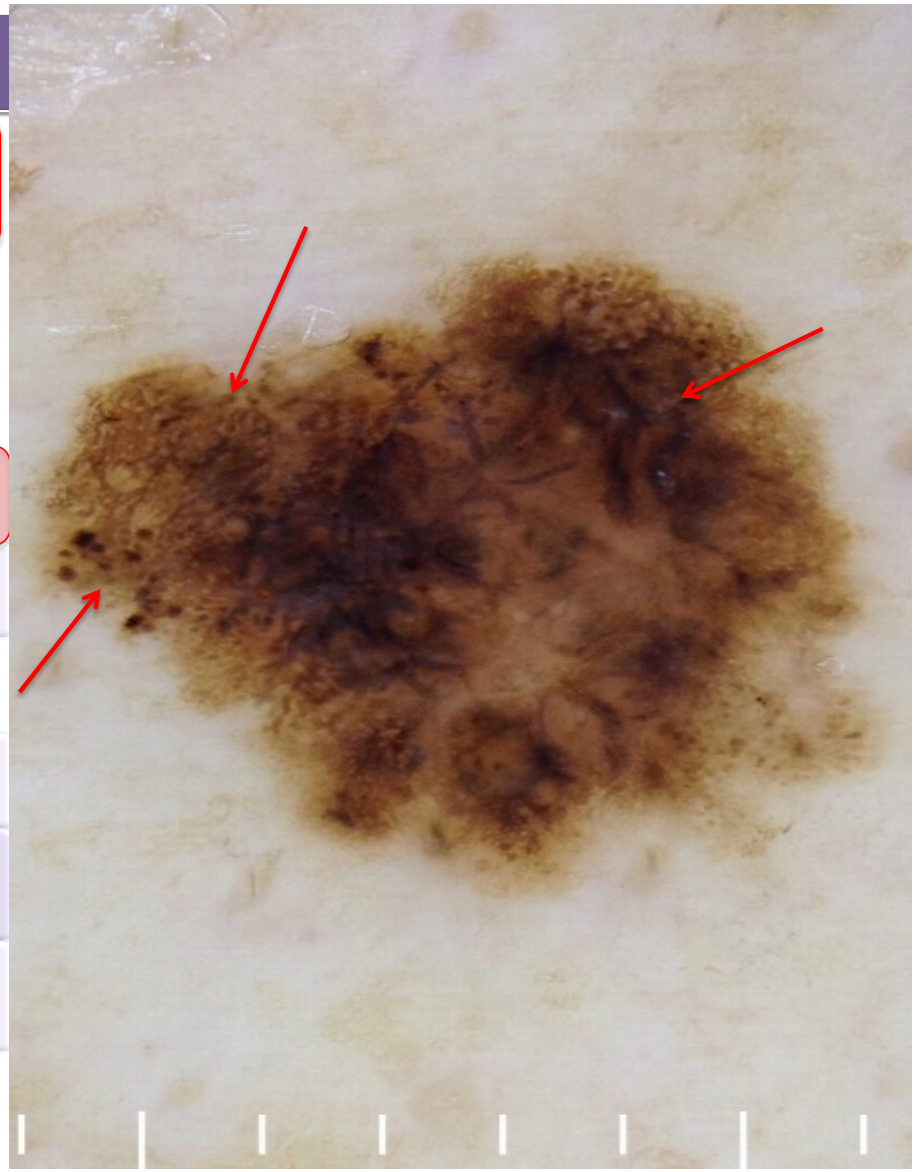
Shiny white structures	9 (9687)	30.5 (15.8-50.7)	93.6 (85.6-97.3)	6.7 (2.5-17.9)	95.2

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

Other Case

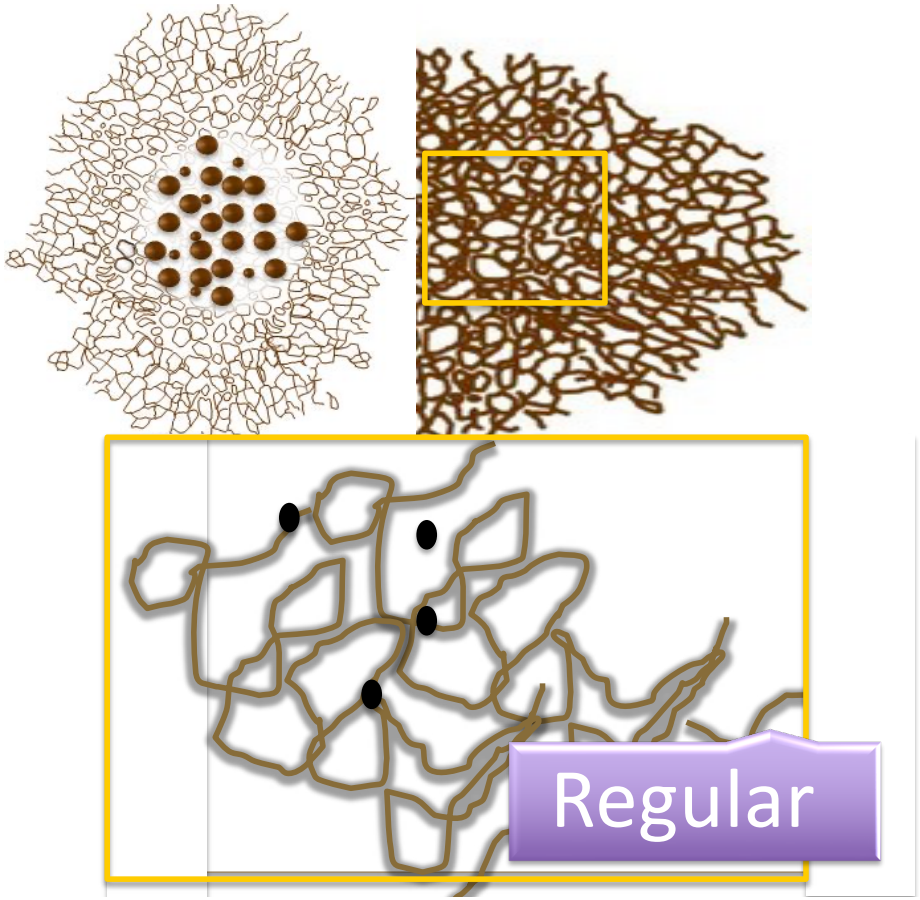
mm

Melanoma Specific Structures	OR
Atypical network, including angulated lines	1.1 - 9
Negative pigment network	1.8
Streaks (pseudopods & radial streaming)	1.6 – 5.8
Atypical dots and/or globules	2.9 – 4.8
Off-centered blotch	4.1 – 4.9
Peripheral tan structureless areas	2.8 – 2.9
Blue-white veil overlying raised areas	2.5 – 13
Regression structures • Blue-white veil overlying macular areas, scar-like areas and/or peppering	3.1– 18.3
Atypical vascular structures • Dotted, serpentine, corkscrew, and polymorphous vessels (>1 morphology), milky-red areas, red globules	1.5– 7.4
Shiny white lines (Crystalline structures)	9.7



Dots and Globules

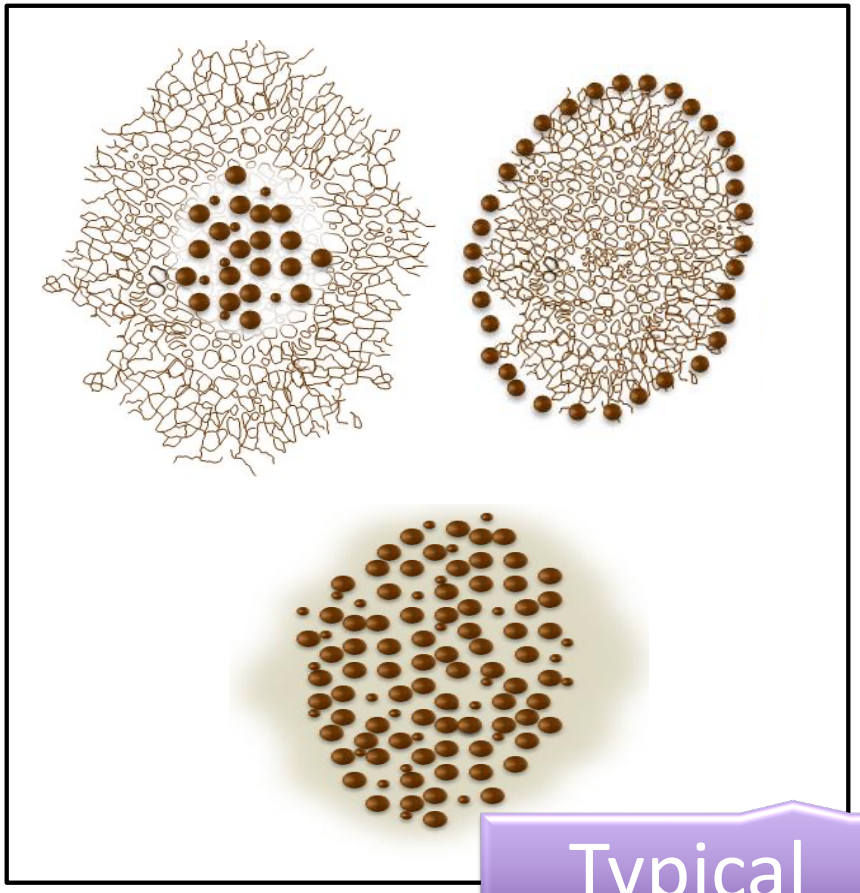
Dots



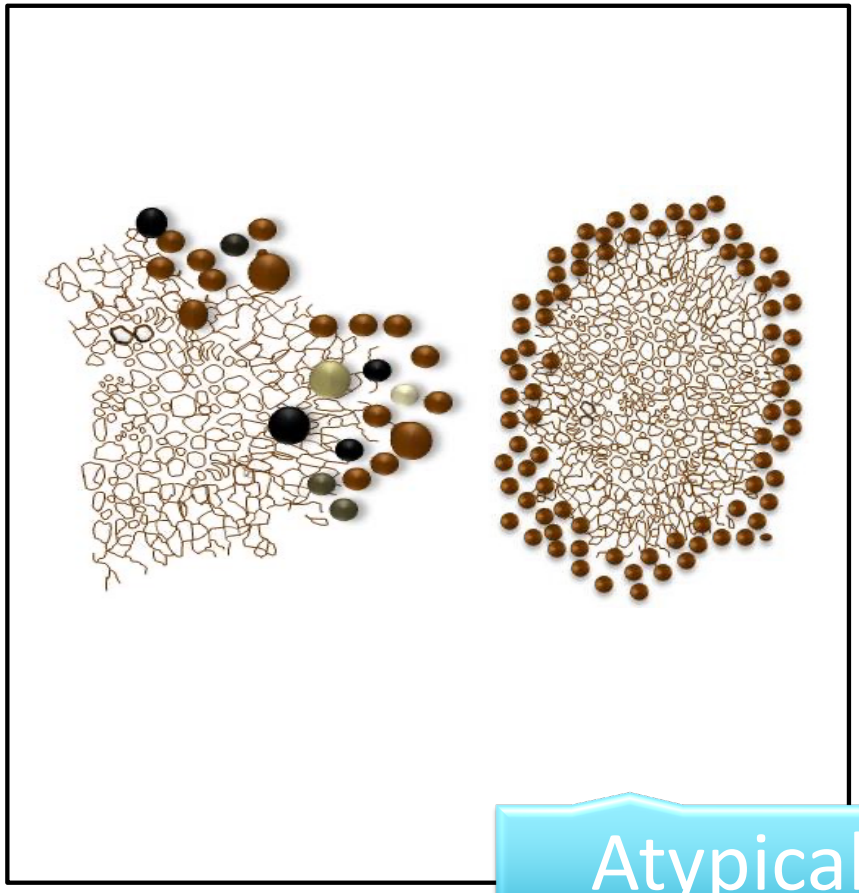
Regular

Irregular

Globules

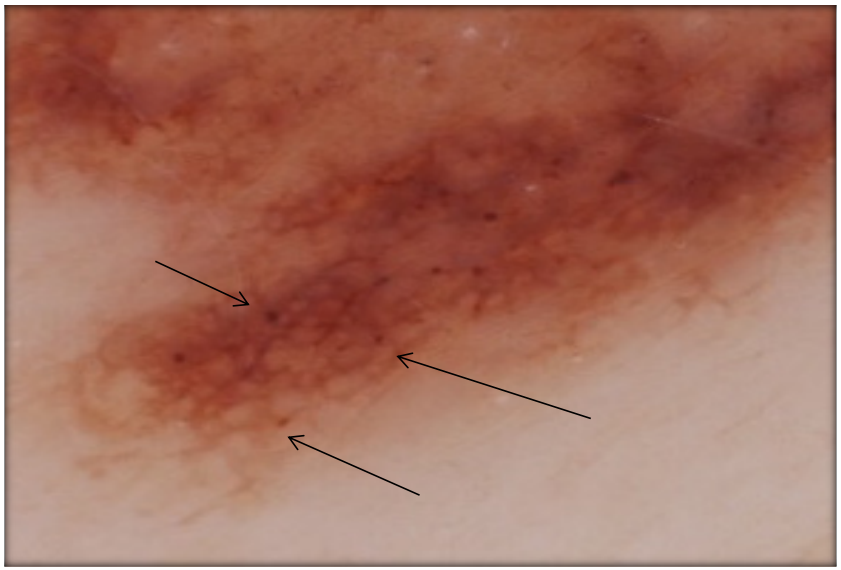


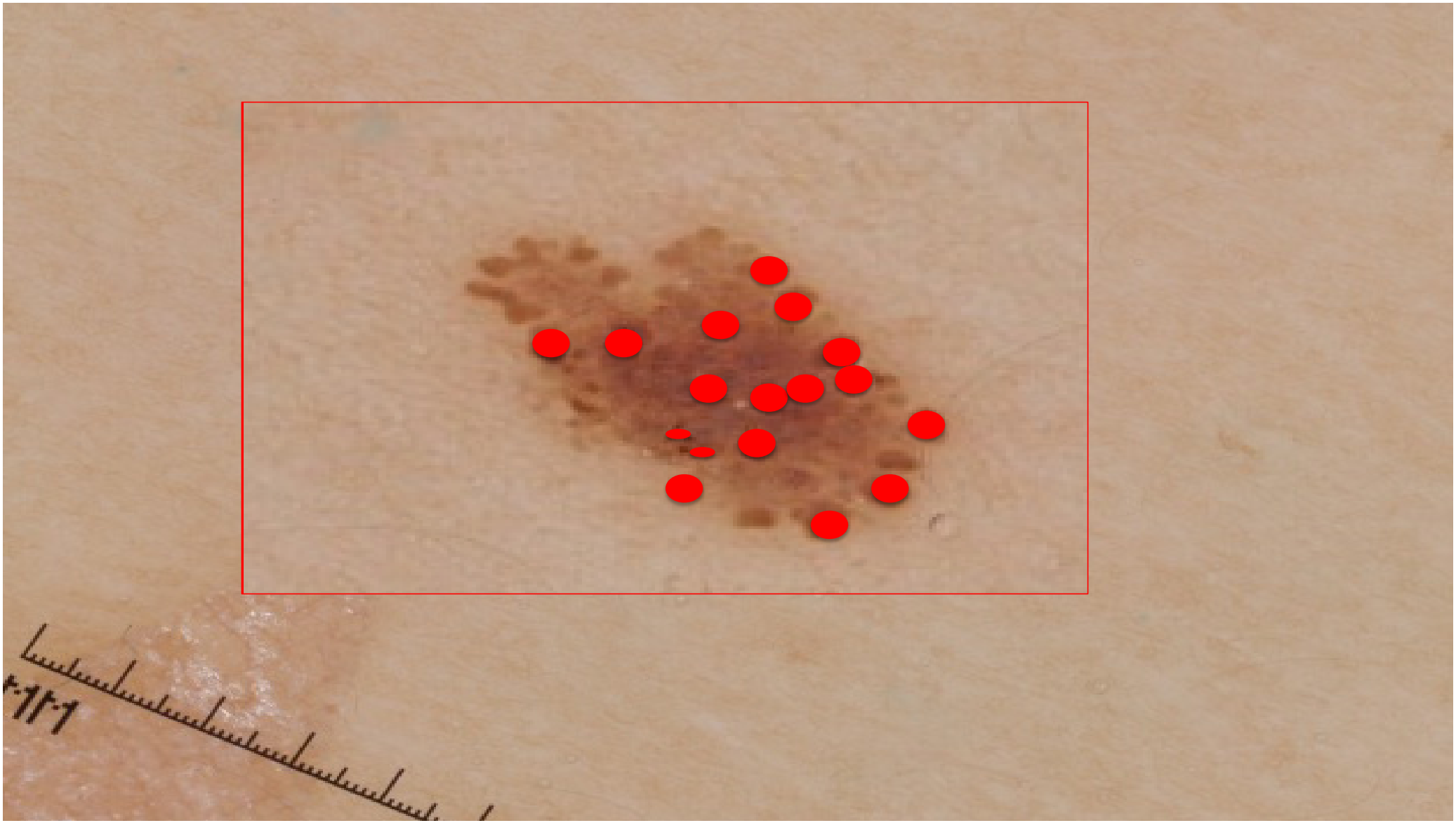
Typical

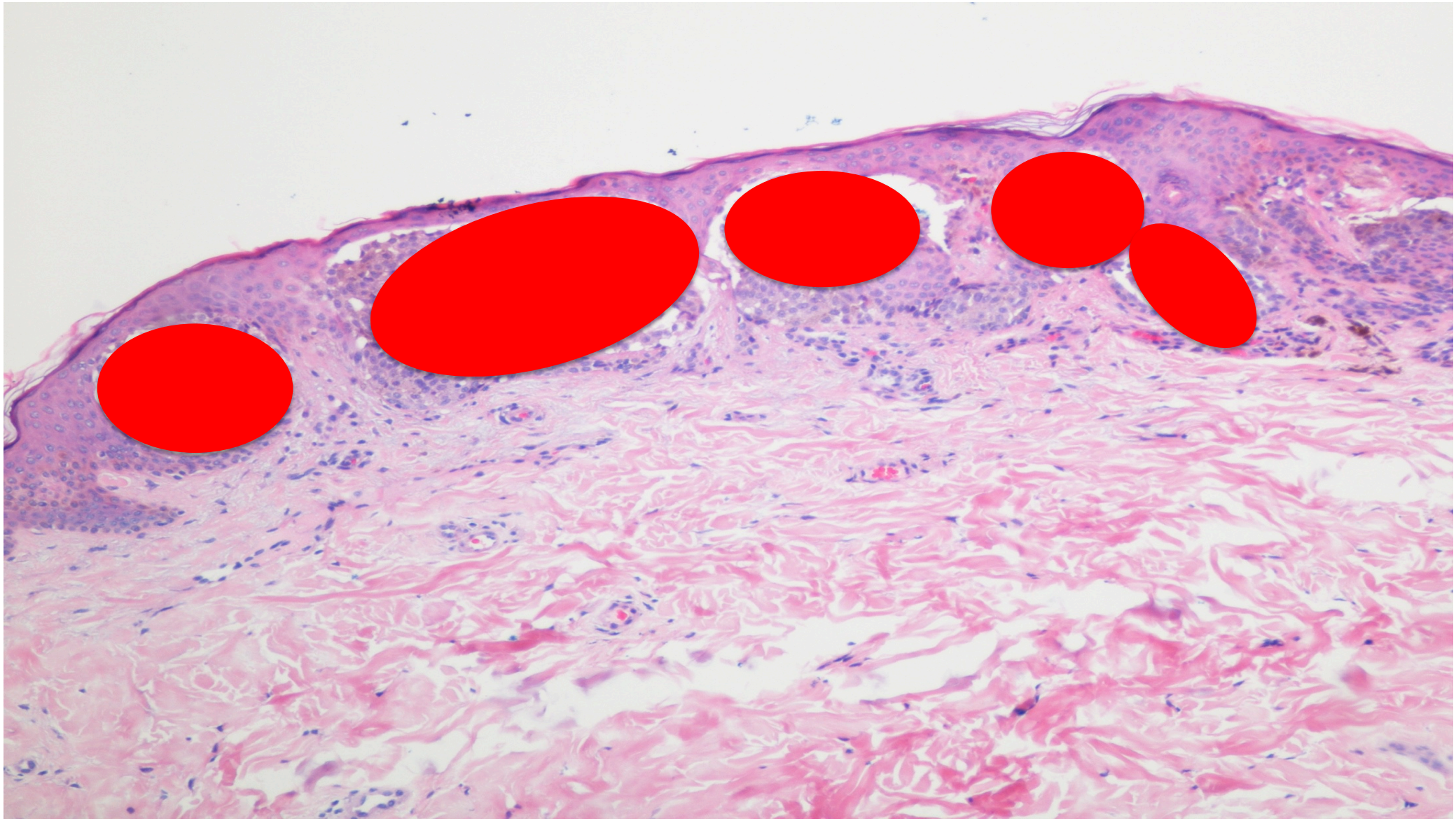


Atypical

Typical Globules and Dots







Atypical Dots and/or Globules

Multiple ***globules*** of different size, shape, and color. Asymmetrically and/or focally distributed

Dots Not associated with the network or located at the periphery of the lesion.

Melanoma Specific Structures	OR
Atypical network, including angulated lines	1.1 - 9
Negative pigment network	1.8
Streaks (pseudopods & radial streaming)	1.6 – 5.8
Atypical dots and/or globules	2.9 – 4.8
Off-centered blotch	4.1 – 4.9
Peripheral tan structureless areas	2.8 – 2.9
Blue-white veil overlying raised areas	2.5 – 13
Regression structures • Blue-white veil overlying macular areas, scar-like areas and/or peppering	3.1– 18.3
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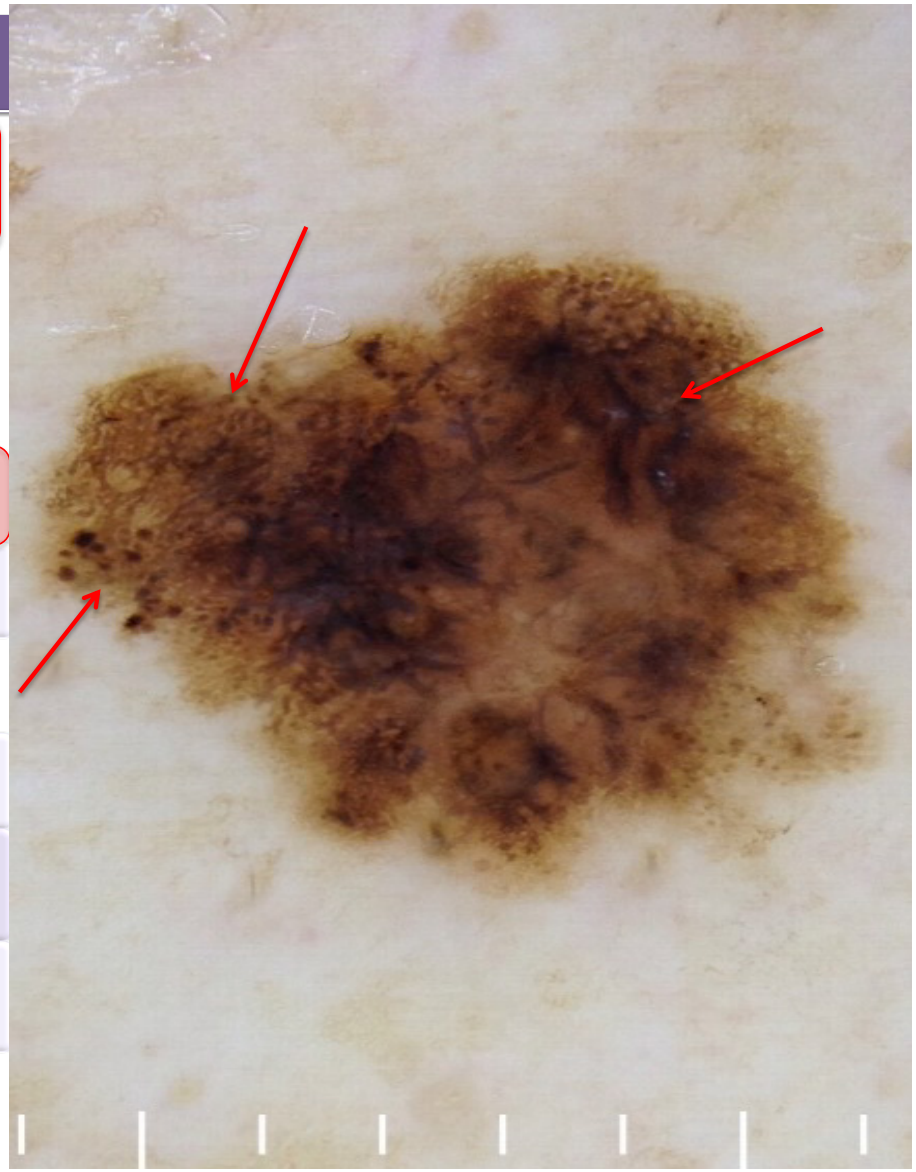
Shiny white lines (Crystalline structures)	9.7



Atypical dots and globules

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Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Irregular pigmentation	5 (1226)	62.3 (31.2-85.8)	78.6 (57.6-90.8)	6.4 (2.0-20.5)	87.9
Blue-white veil	17 (10 128)	60.6 (46.7-72.9)	79.7 (71.8-85.9)	6.3 (3.7-10.7)	89.0
Atypical network	19 (11 787)	56.8 (43.6-69.2)	71.8 (59.9-81.3)	3.3 (2.4-4.5)	83.8
Multicomponent pattern	9 (12 299)	53.7 (40.4-66.4)	82.4 (72.2-89.4)	5.6 (2.4-13.0)	96.6
Atypical dots and/or globules	17 (5497)	49.7 (37.8-61.8)	73.0 (61.8-81.9)	2.7 (1.8-4.1)	85.1

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

Angulated Lines

Angulated Lines

Grey or brown lines meeting at angles

Rhomboidal structures

Zig-zag lines

Polygonal structures

Arch Dermatol 2010;146:1444.

J Am Acad Dermatol 2000;42:25-32.
Dermatol Pract Concept 2014;4:77-82.

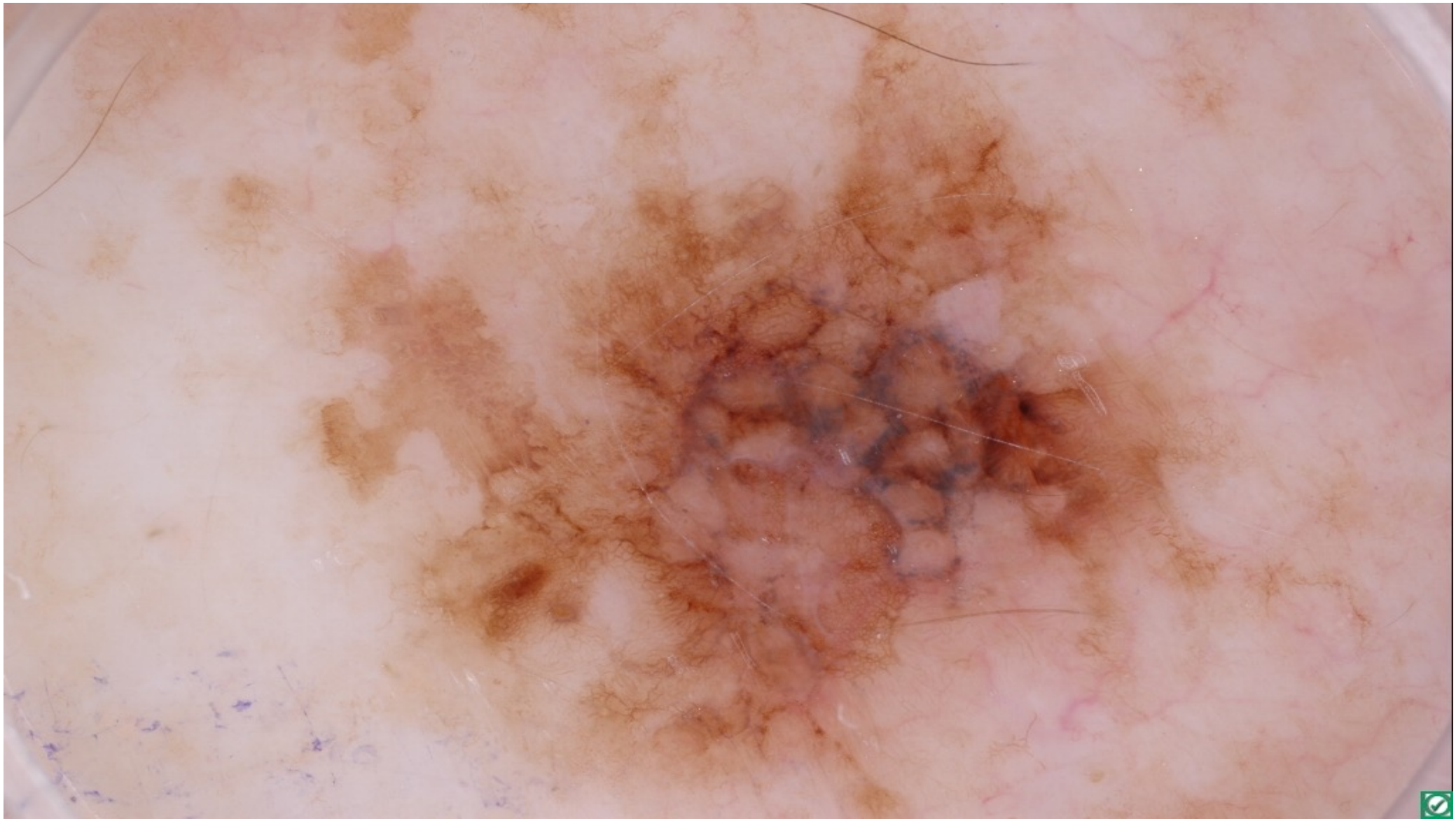
Angulated lines

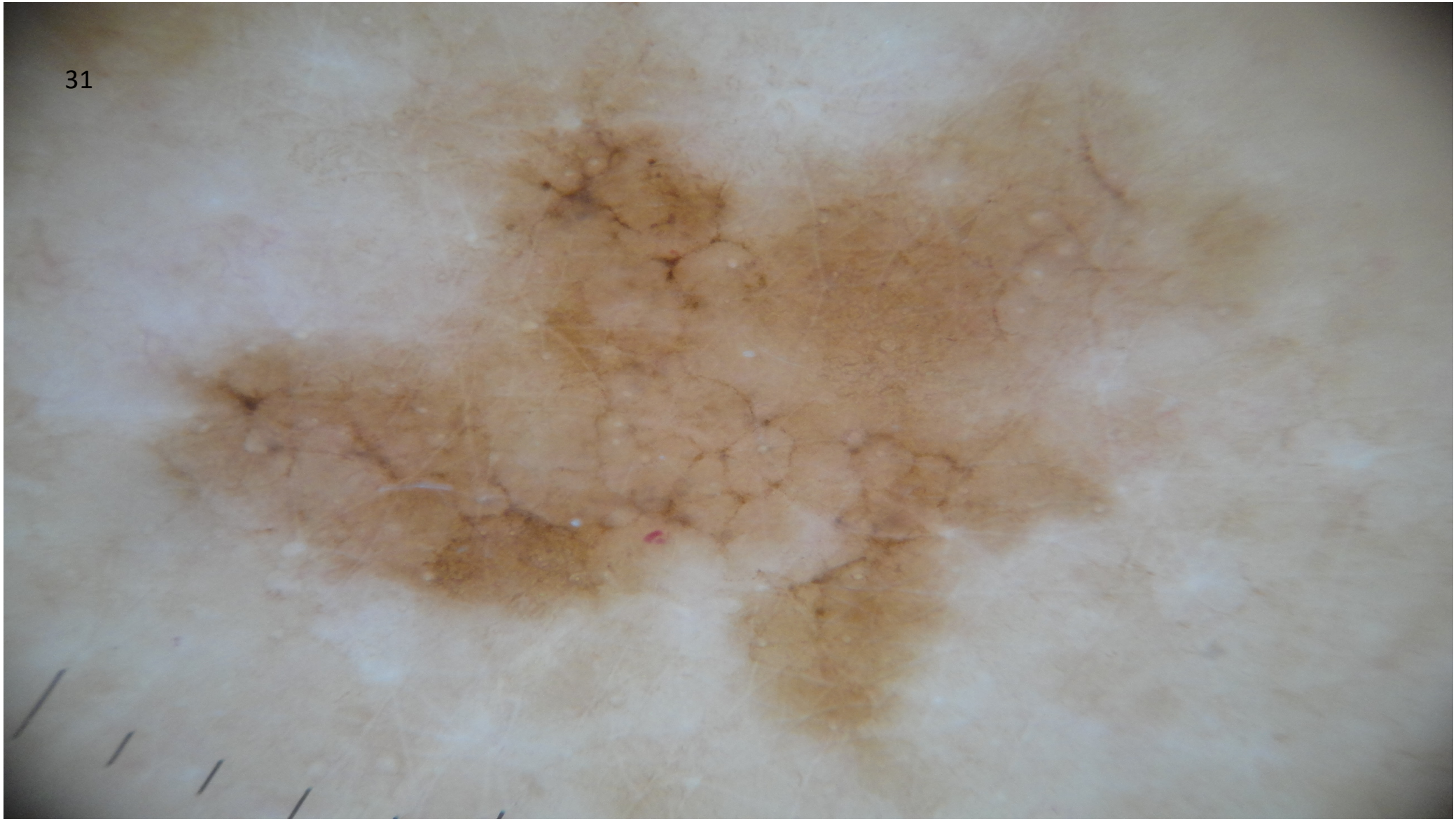
- Confluent melanoma cells at the DEJ with dermal melanophages

Case Report/Case Series

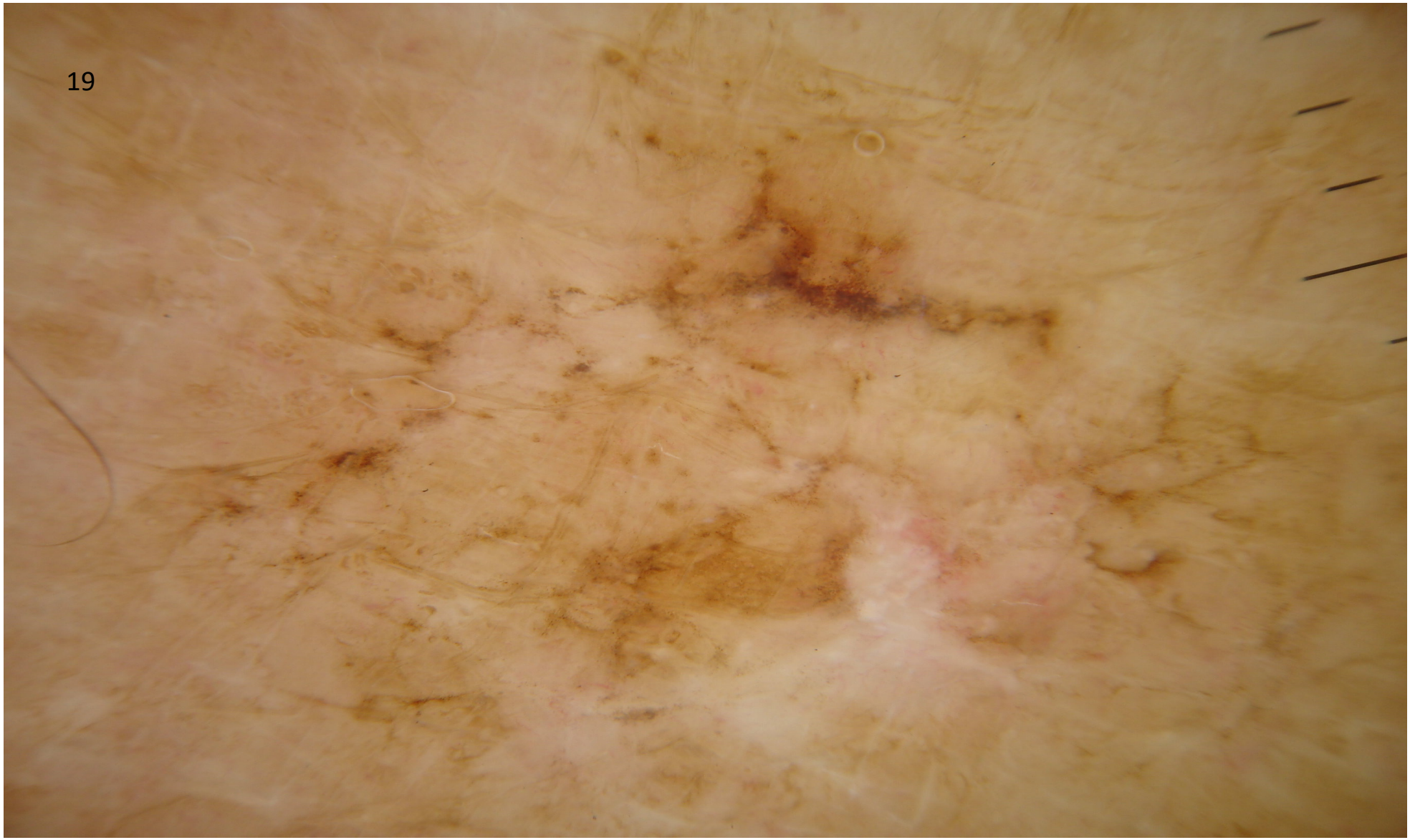
A Digital Dermoscopy Follow-up Illustration and a Histopathologic Correlation for Angulated Lines in Extrafacial Lentigo Maligna

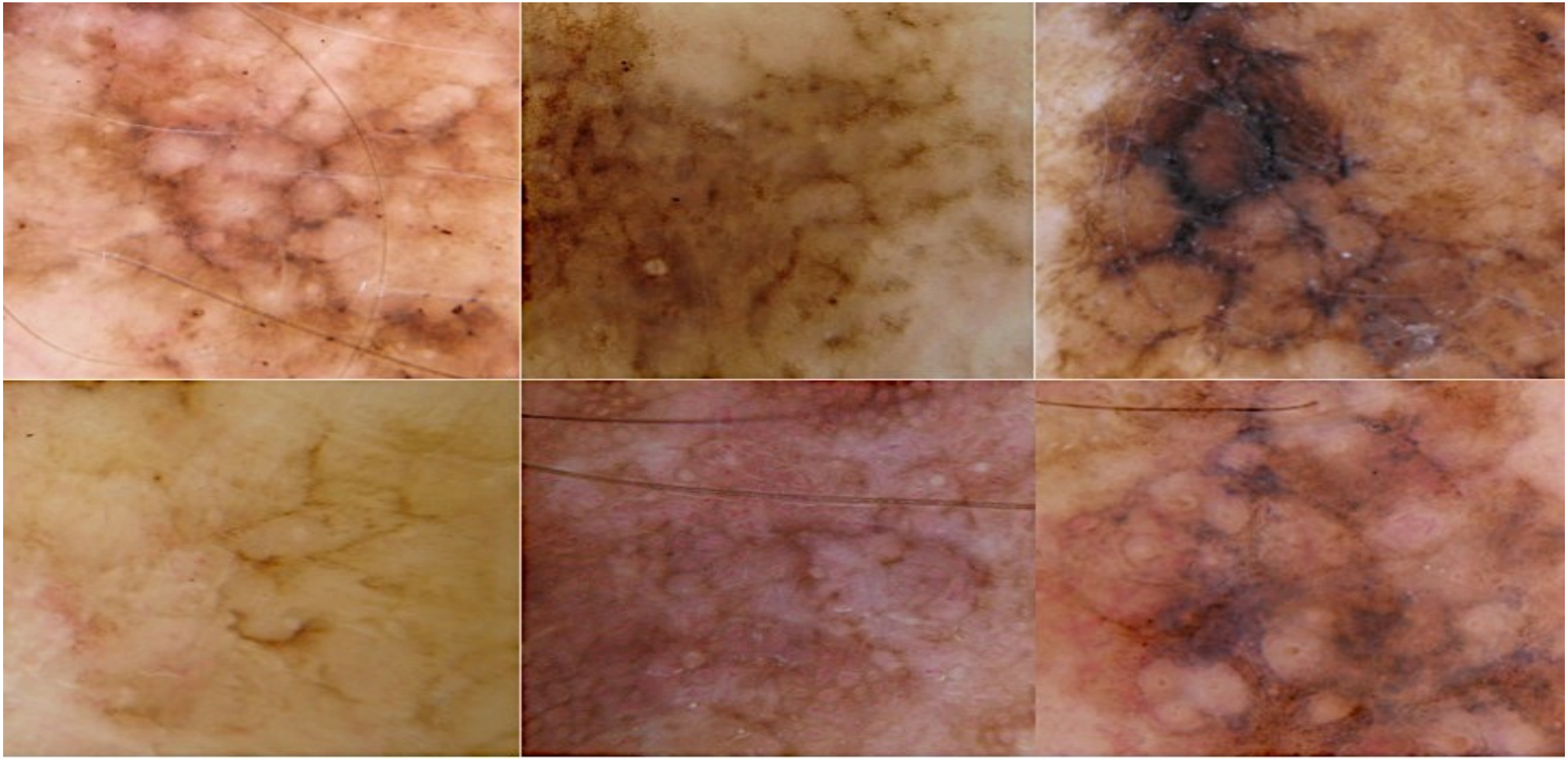
Alexia Vanden Daelen, MD; Ingrid Ferreira, MD; Liliane Marot, MD; Isabelle Tromme, PhD




31

19





Angulated Lines: Frequent finding, maybe the only clue to suspect MM on non-Facial CSDS

ARTICLE IN PRESS

ORIGINAL ARTICLE

Clinical and dermoscopic characteristics of melanomas on nonfacial chronically sun-damaged skin

Natalia Jaimes, MD,[a] Ashfaq A. Marghoob, MD,[b] Harold Rabinovitz, MD,[c] Ralph P. Braun, MD,[d] Alan Cameron, MBBS,[e] Cliff Rosendahl, MBBS, PhD,[e] Greg Canning, MBBS,[f] and Jeffrey Keir, MBBS, MFamMed[g]

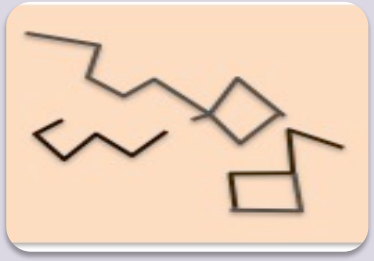
Medellín, Colombia; New York, New York; Plantation, Florida; Zürich, Switzerland; and Brisbane, Townsville, and Ballina, Australia

Melanoma on Non-Facial CSDS

Dermoscopic Patterns – present in 79% of lesions

Patchy peripheral pigmented islands

70 (38%)



Angulated line pattern

56 (30%)

Tan structureless & granularity pattern

20 (11%)

No pattern / Non-specific

40 (22%)

Jaimes et al. JAAD 2015

Case

Melanoma Specific Structures	OR
Atypical network, including angulated lines	1.1 - 9
Negative pigment network	1.8
Streaks (pseudopods & radial streaming)	1.6 – 5.8
Atypical dots and/or globules	2.9 – 4.8
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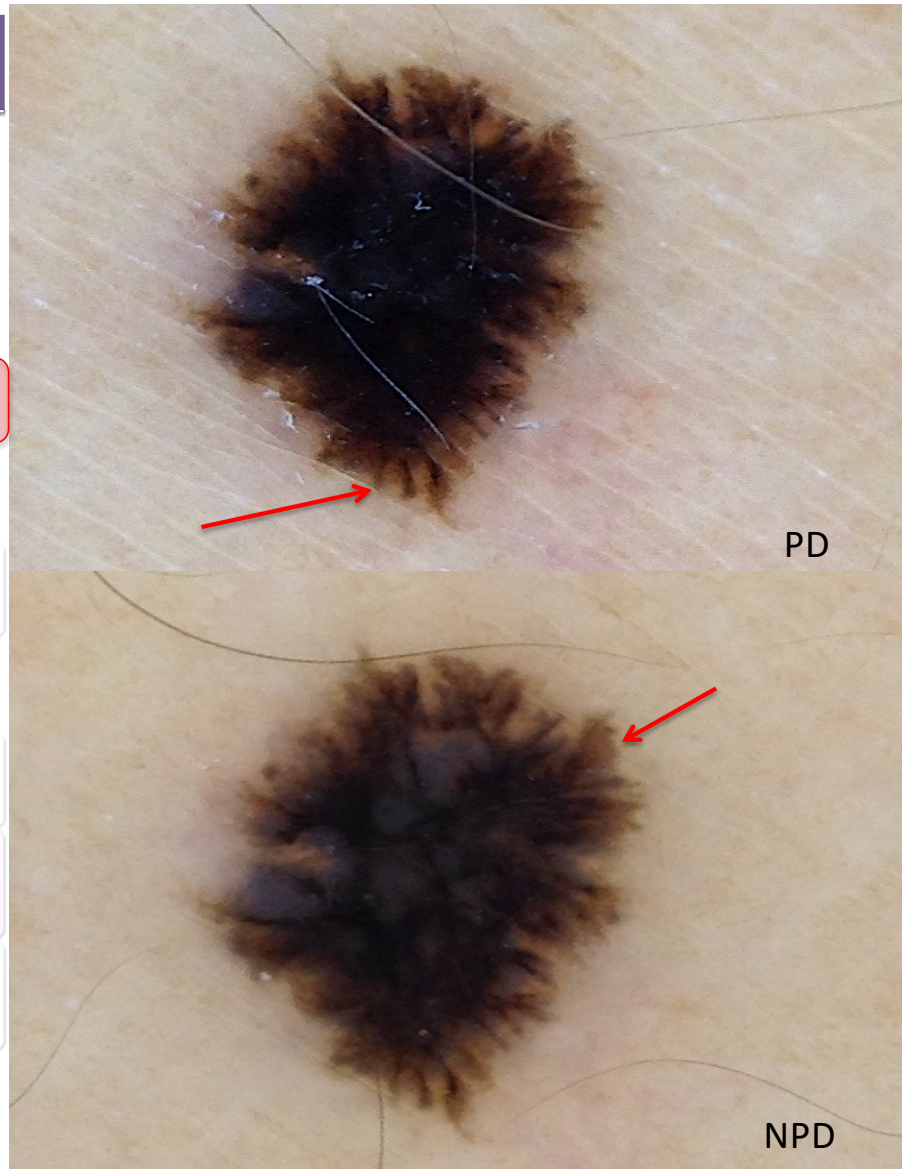
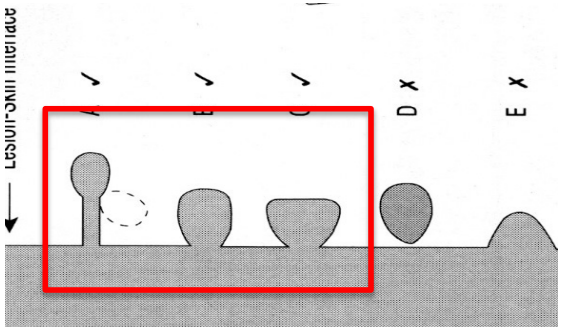
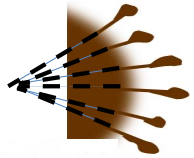
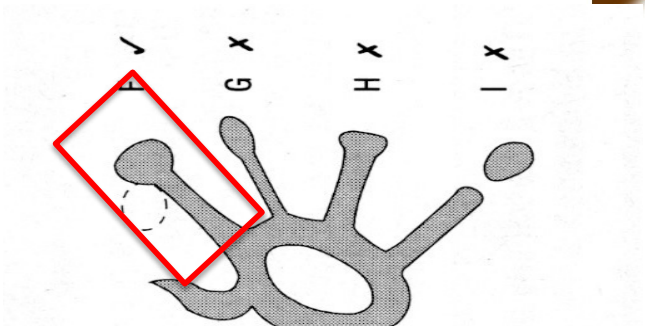
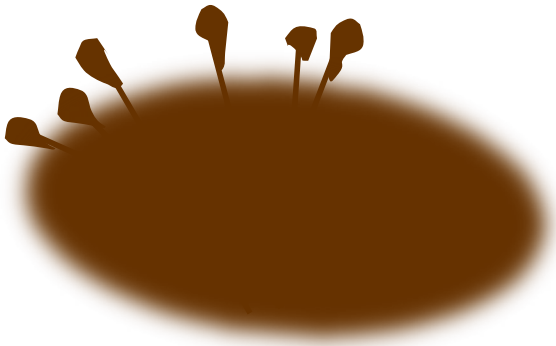


Streaks









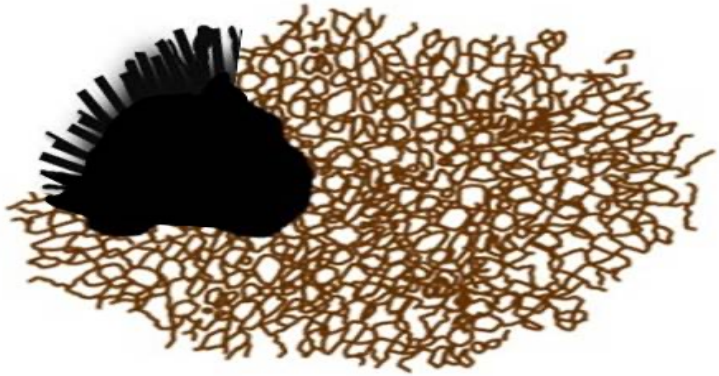
Radial Streaming

Pseudopods

Streaks

Regular

Streaks symmetrically distributed around the entire perimeter



Irregular

Streaks asymmetrically distributed & focally present at the periphery

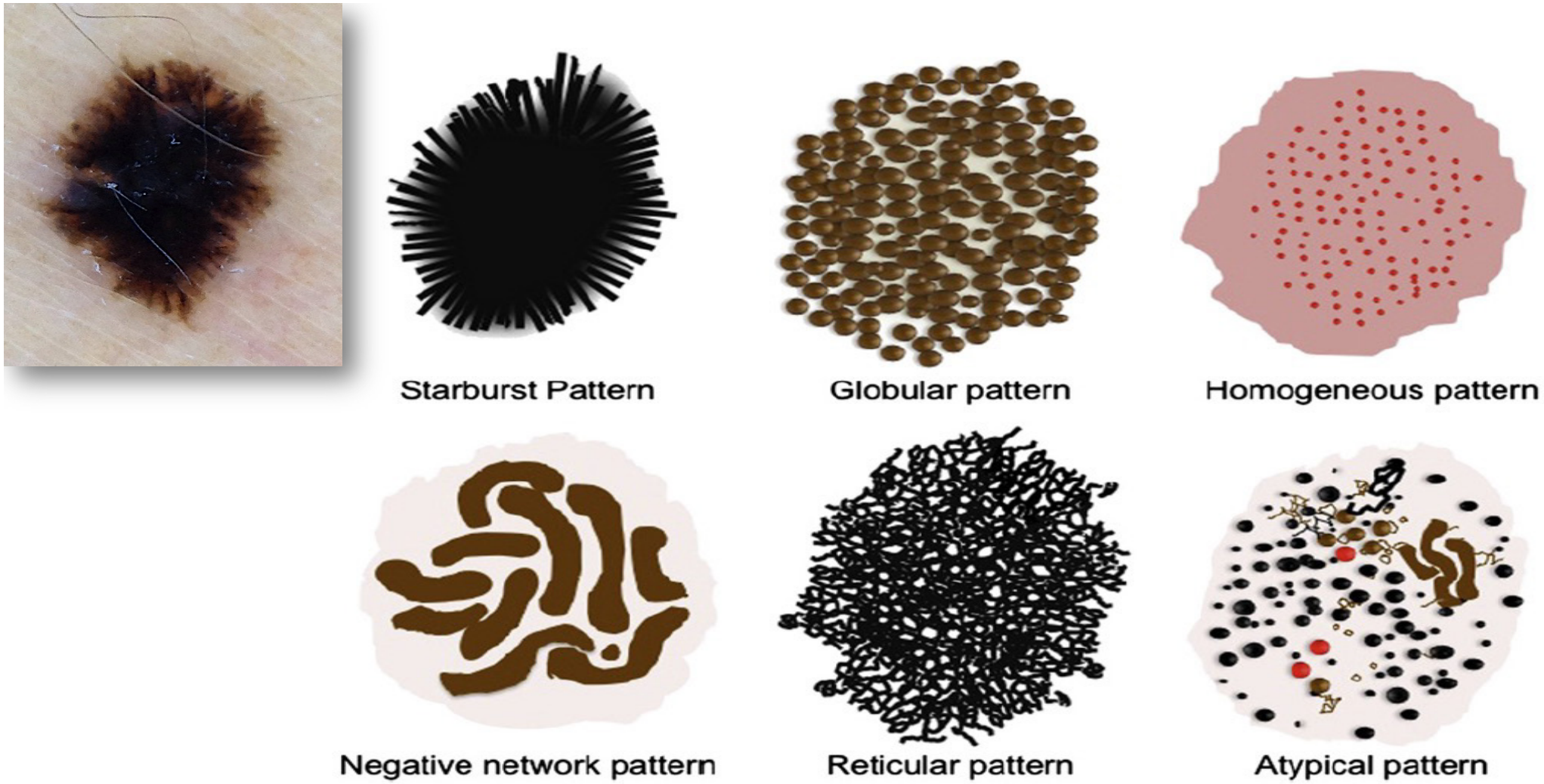


Fig. 11. Schematics of dermoscopic patterns commonly seen in Spitz nevi.

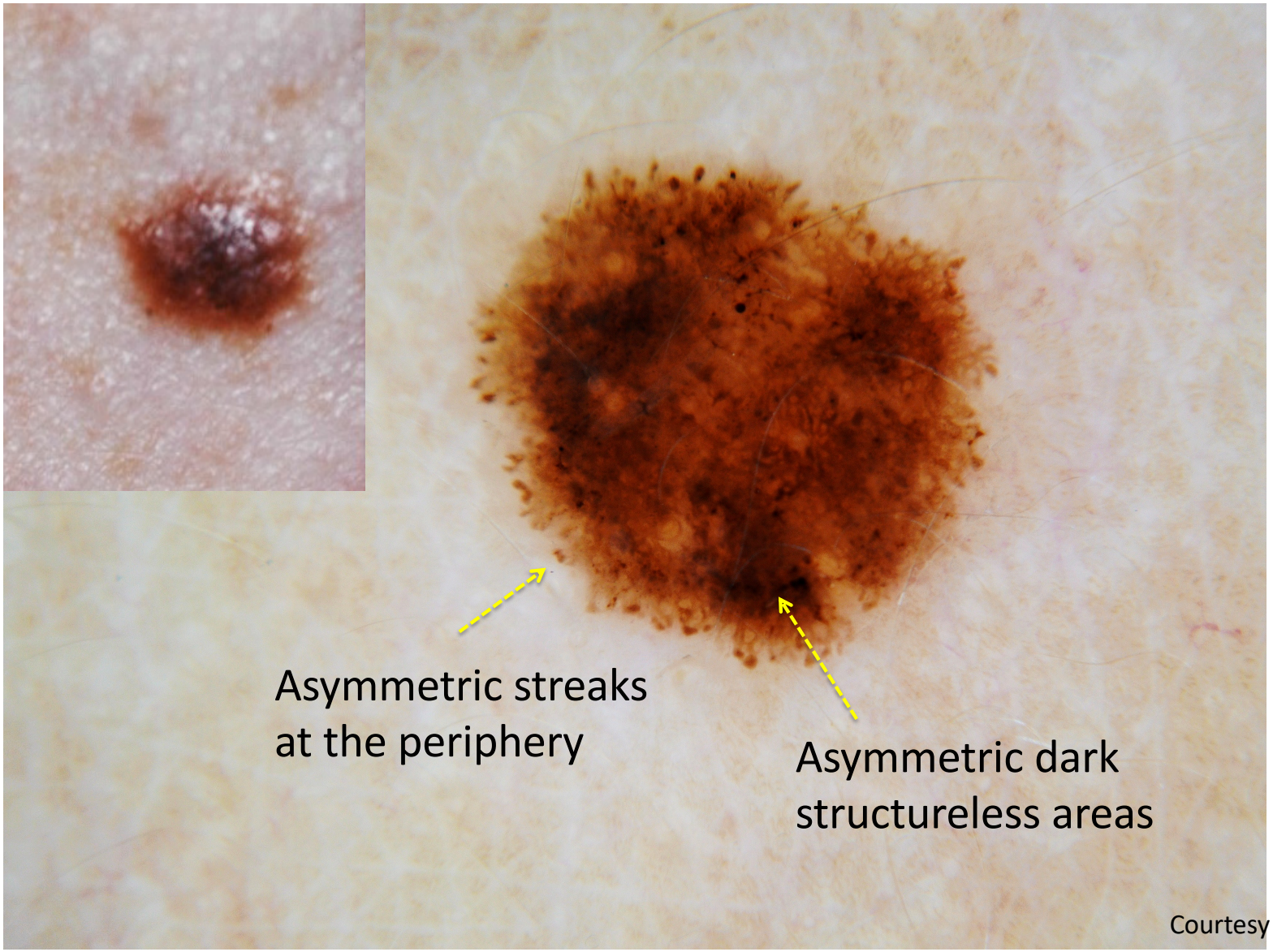
Jaimes, Kerner, et al. Derm Clin 2013

Streaks

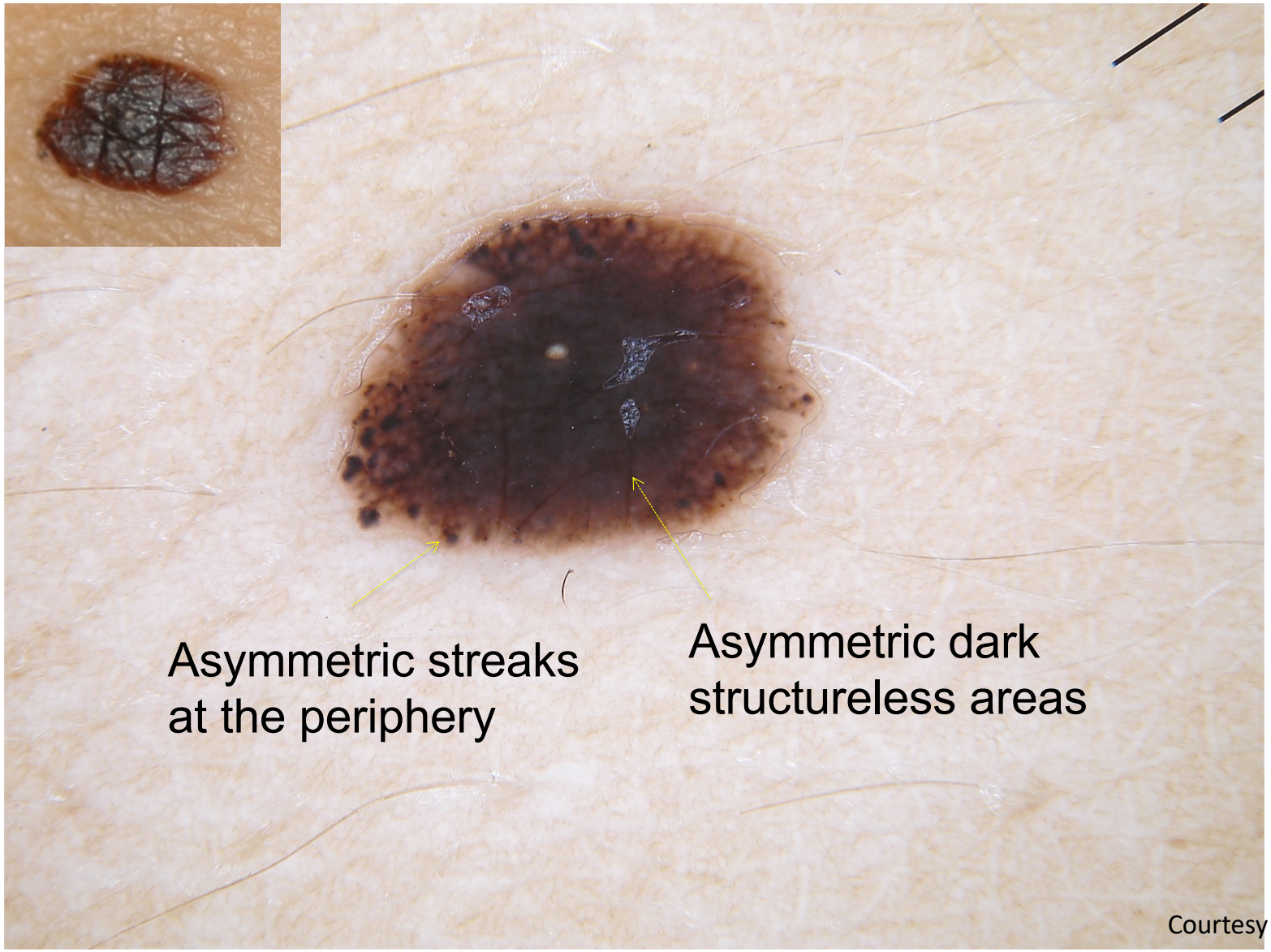
Courtesy A. Marghoob, MD

Spitz Nevus

Melanoma



Courtesy Dr. Rabinovitz



Courtesy Dr. Rabinovitz

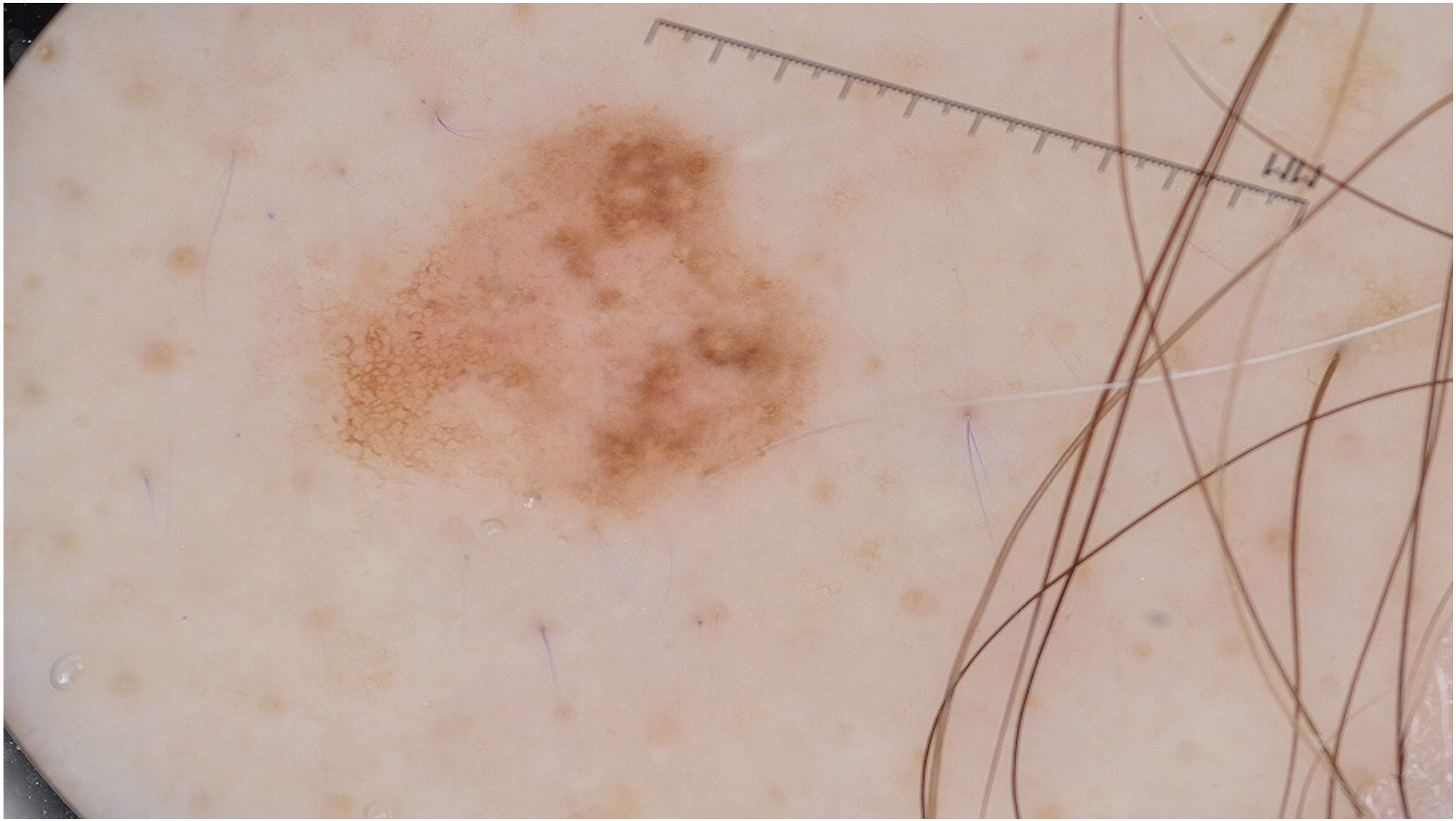
Streaks

Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

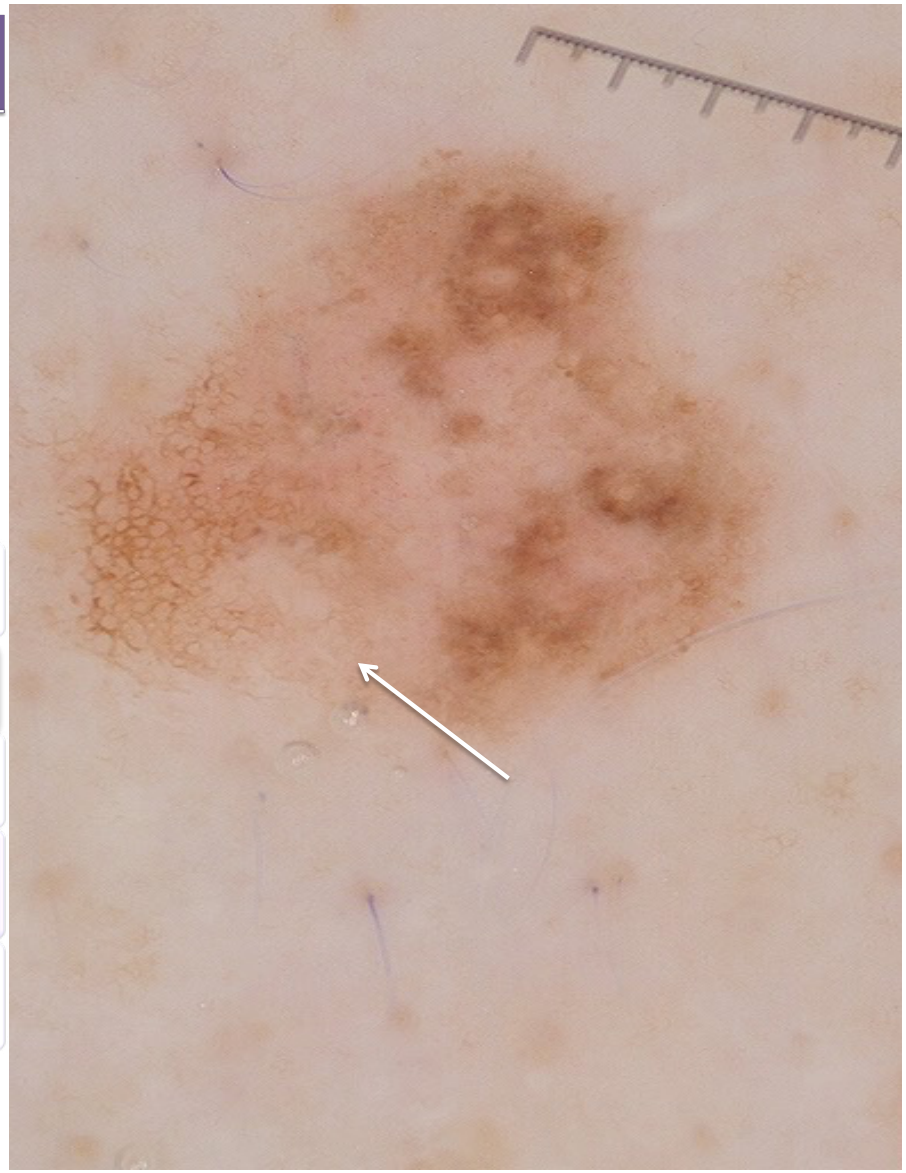
Linear irregular vessels	5 (1806)	23.2 (9.7-46.0)	86.8 (74.3-93.7)	2.1 (1.3-3.6)	61.0
Linear irregular vessels and polymorphous/atypical vessels	18 (11 284)	22.1 (14.6-32.1)	81.6 (83.7-91.9)	2.3 (1.7-3.1)	35.8
Polymorphous/atypical vessels	17 (11 505)	21.9 (13.3-33.8)	89.0 (83.6-93.0)	2.4 (1.7-3.4)	80.6
Streaks	18 (11 035)	21.1 (14.0-30.4)	92.1 (88.4-94.7)	3.1 (2.2-4.5)	77.5
Streaks and pseudopods	18 (11 035)	19.3 (13.9-26.2)	83.8 (91.0-95.7)	3.4 (2.6-4.6)	38.1
Pseudopods	7 (6751)	15.4 (8.8-25.6)	97.3 (94.3-98.7)	6.7 (2.7-16.1)	70.3

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

Case



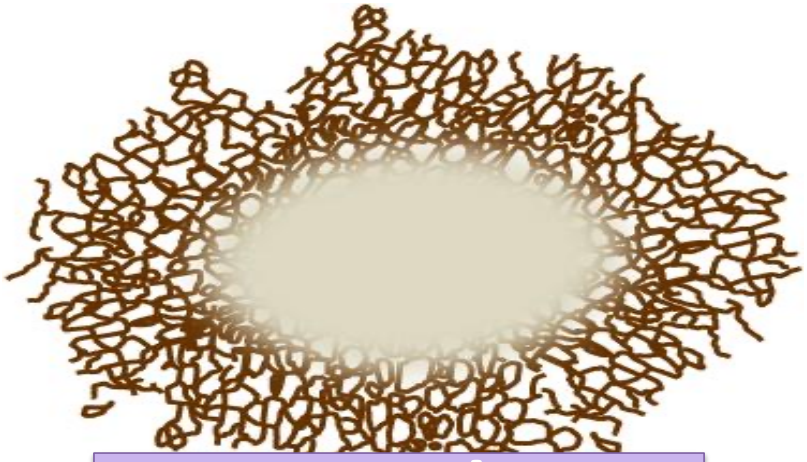
Melanoma Specific Structures	OR
Atypical network, including angulated lines	1.1 - 9
Negative pigment network	1.8
Streaks (pseudopods & radial streaming)	1.6 – 5.8
Atypical dots and/or globules	2.9 – 4.8
Off-centered blotch	4.1 – 4.9
Peripheral tan structureless areas	2.8 – 2.9
Blue-white veil overlying raised areas	2.5 – 13
Regression structures • Blue-white veil overlying macular areas, scar-like areas and/or peppering	3.1– 18.3
Atypical vascular structures • Dotted, serpentine, corkscrew, and polymorphous vessels (>1 morphology), milky-red areas, red globules	1.5– 7.4
Shiny white lines (Crystalline structures)	9.7



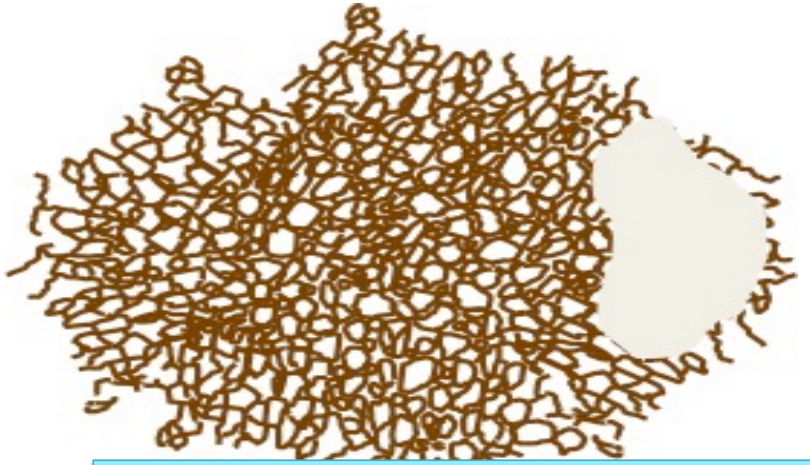
Tan structureless areas

- absence of dermoscopy strucutres
- light brown pigmentation

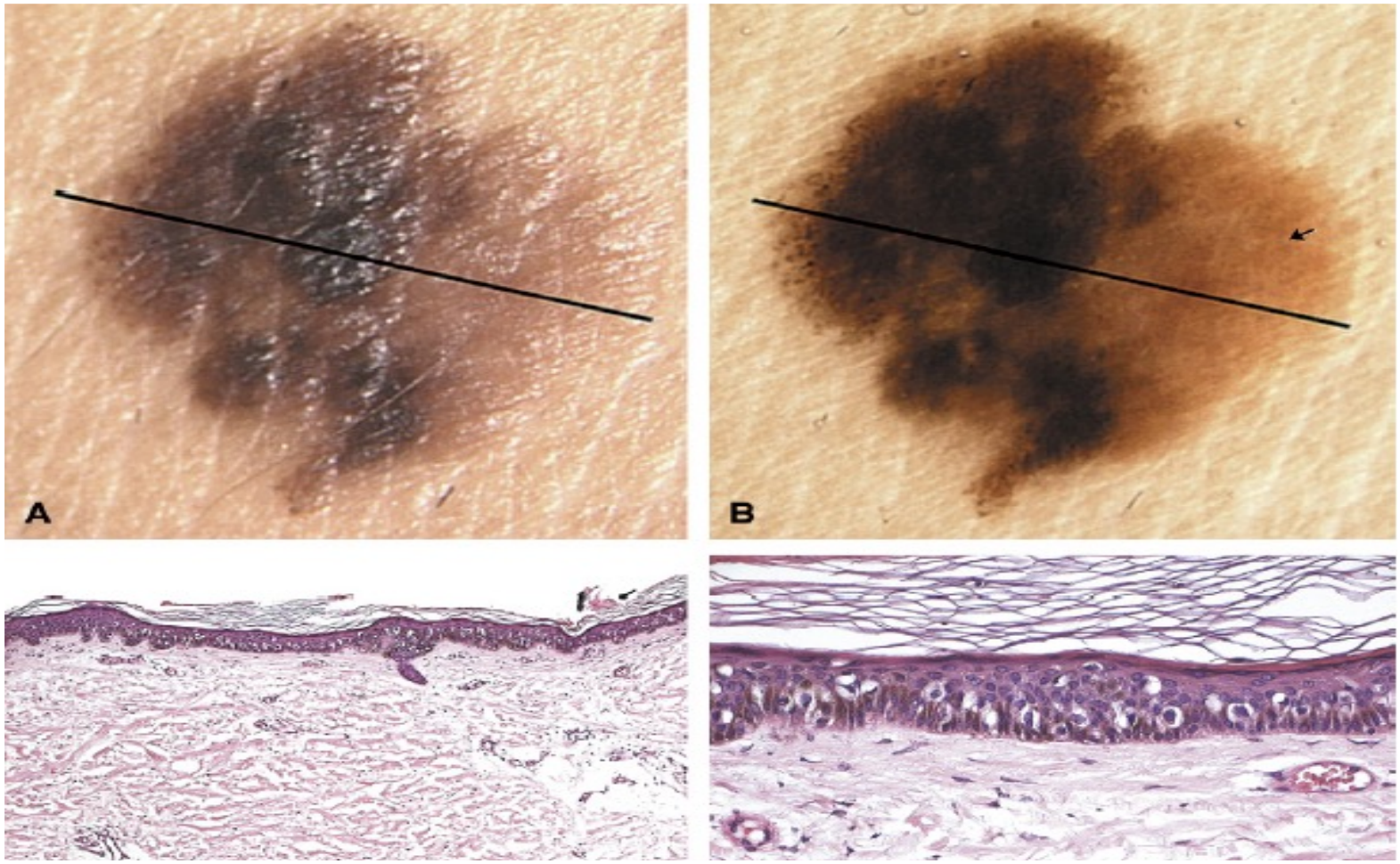
Tan structureless areas



Regular

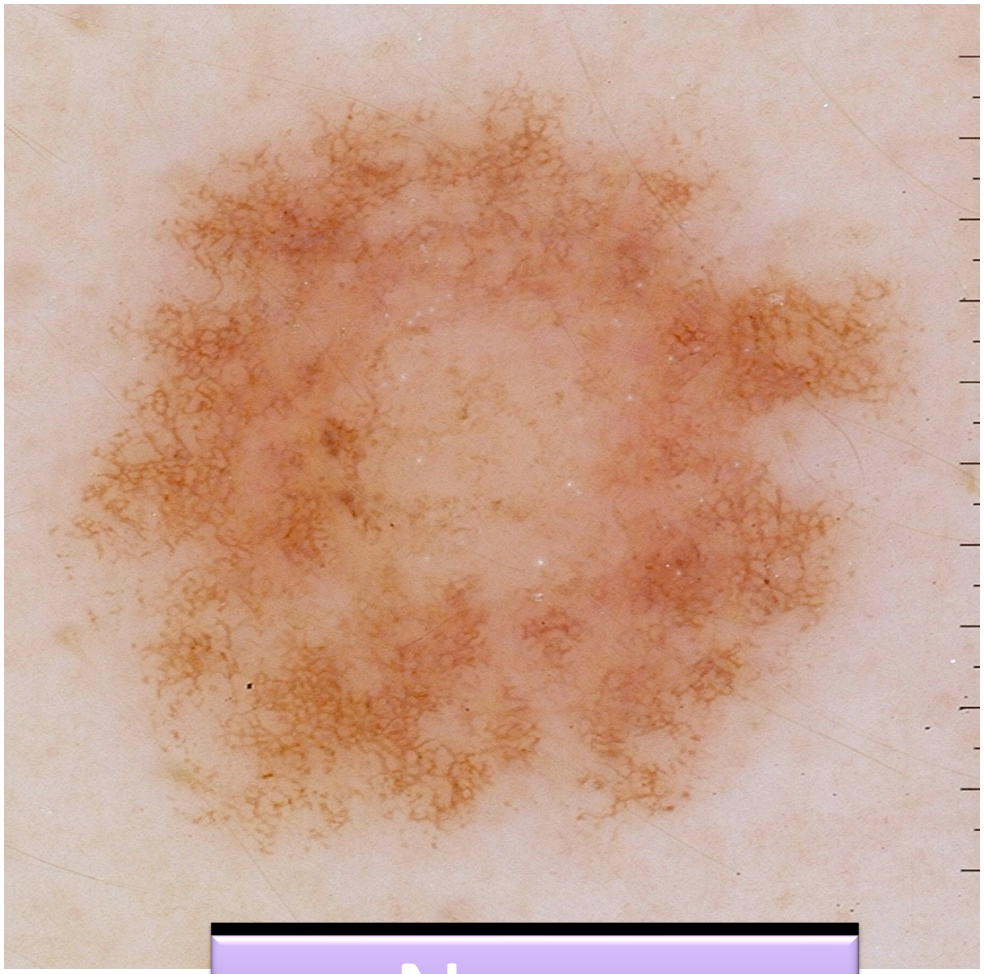


Irregular



Histologically – flattening of rete ridges at DEJ, melanocytes arranged predominately as solitary units + less melanin, pagetoid scatter of melanocytes

Annessi G et al, J JAAD 2007;56:759-67

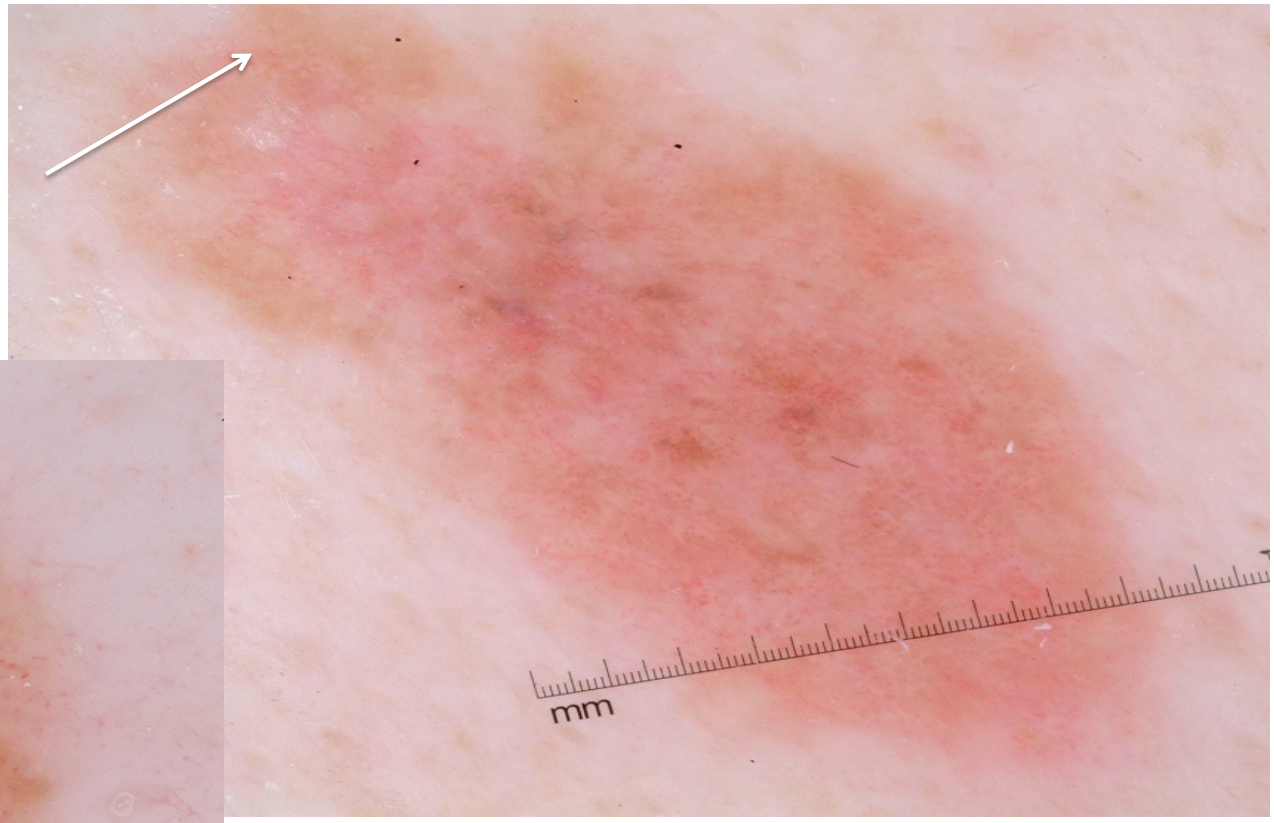


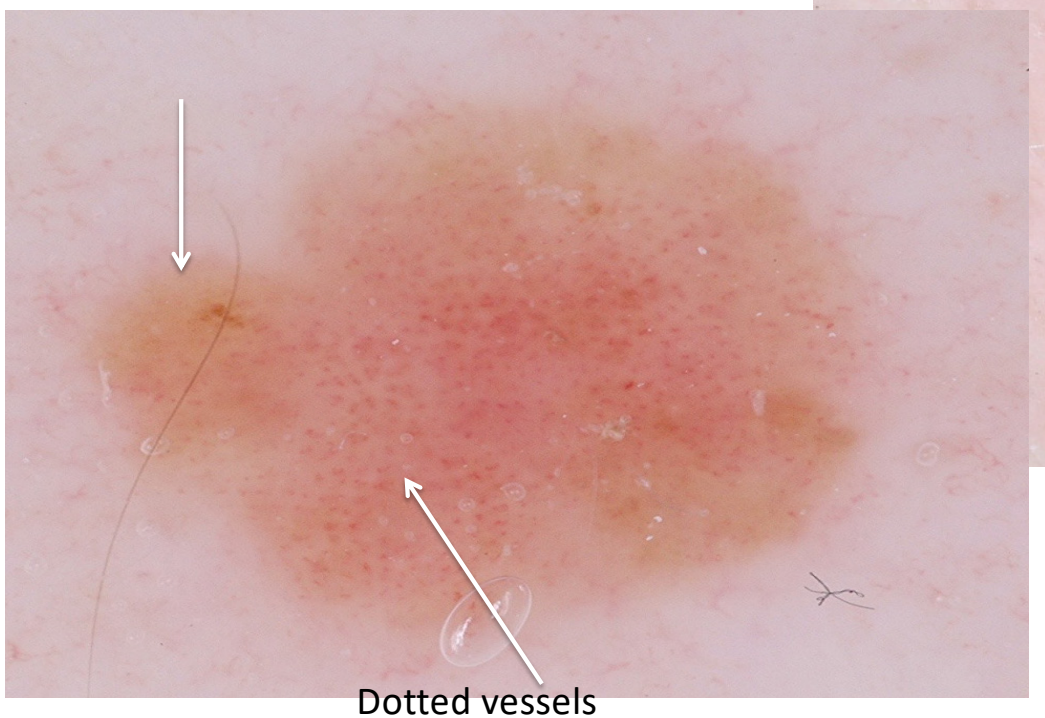
Nevus

Melanoma

Tan structureless areas also a clue in pink lesions!

Look at the periphery





Peripheral tan structureless areas

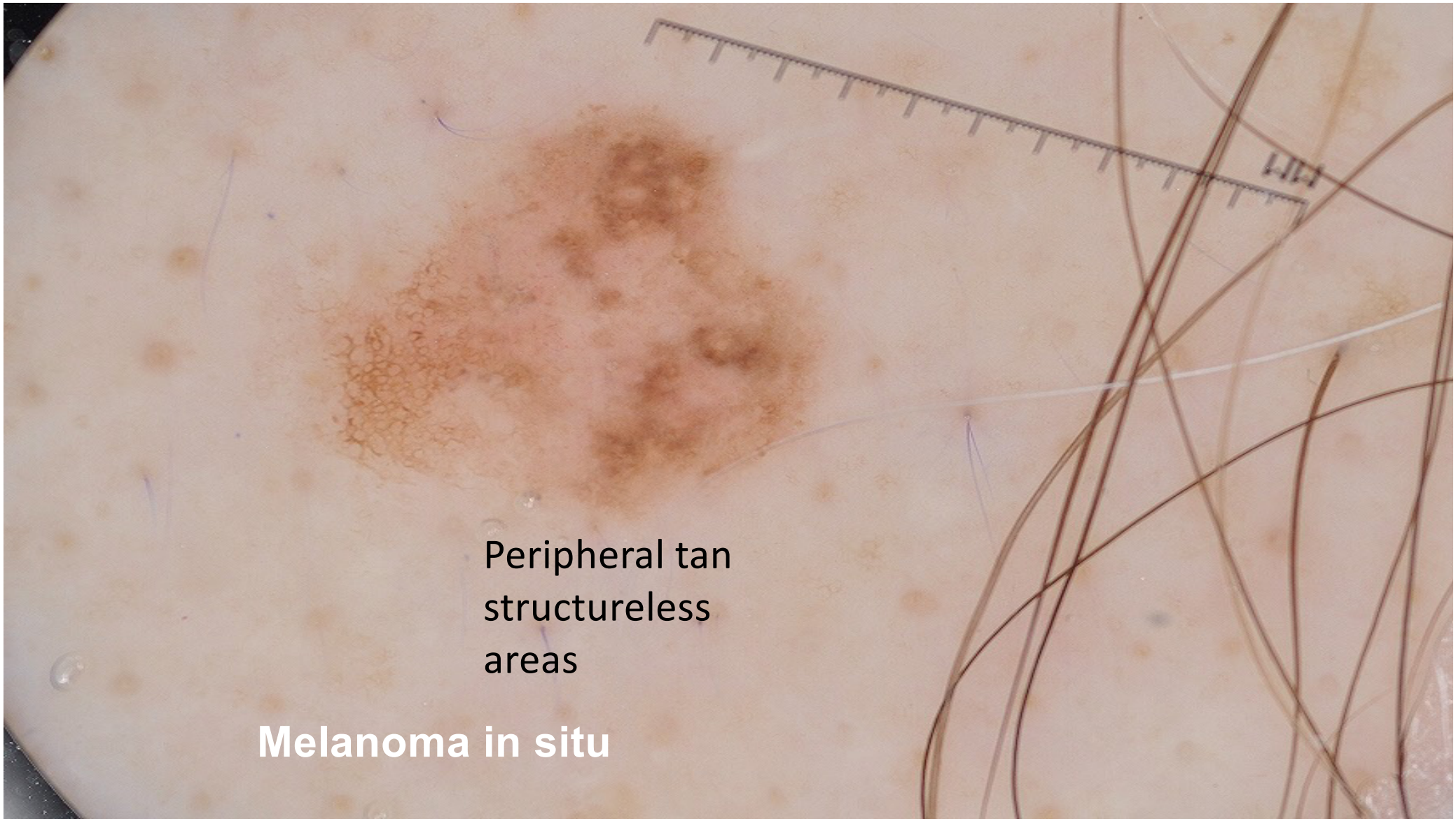
(subtle)

Peripheral Tan Structureless Area

Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

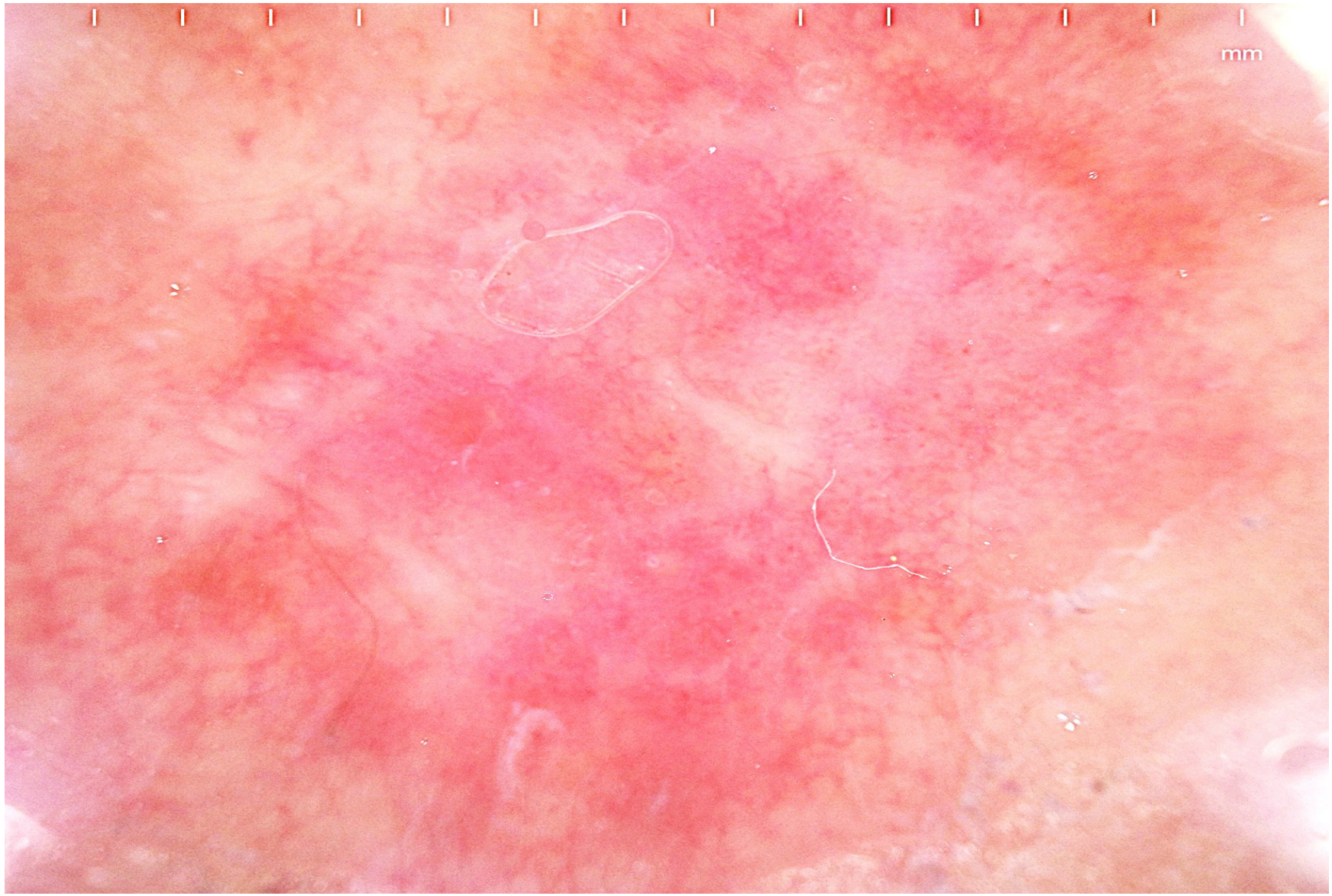
Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Regression	17 (10 542)	48.1 (32.1-64.5)	83.6 (69.7-91.9)	4.6 (3.0-6.9)	84.8
Regression and peppering	21 (11 739)	44.9 (32.0-58.4)	86.5 (77.3-92.4)	4.7 (3.3-6.8)	88.7
Off-center blotch	16 (12 850)	42.1 (29.6-55.6)	84.1 (74.6-90.5)	3.8 (2.7-5.5)	85.8
Peripheral tan structureless area	12 (8285)	37.5 (22.3-55.7)	76.1 (65.6-84.2)	2.0 (1.3-3.0)	50.4
Peppering	7 (7112)	36.8 (19.1-58.9)	93.4 (81.9-97.8)	6.3 (2.4-16.1)	91.6
Negative network	8 (7011)	34.5 (30.5-38.7)	70.8 (47.0-86.8)	1.3 (0.7-2.4)	79.2
Scarlike areas	8 (7328)	31.3 (16.9-50.5)	89.1 (83.7-92.9)	4.4 (2.7-7.2)	76.0
Shiny white structures	9 (9687)	30.5 (15.8-50.7)	93.6 (85.6-97.3)	6.7 (2.5-17.9)	95.2

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

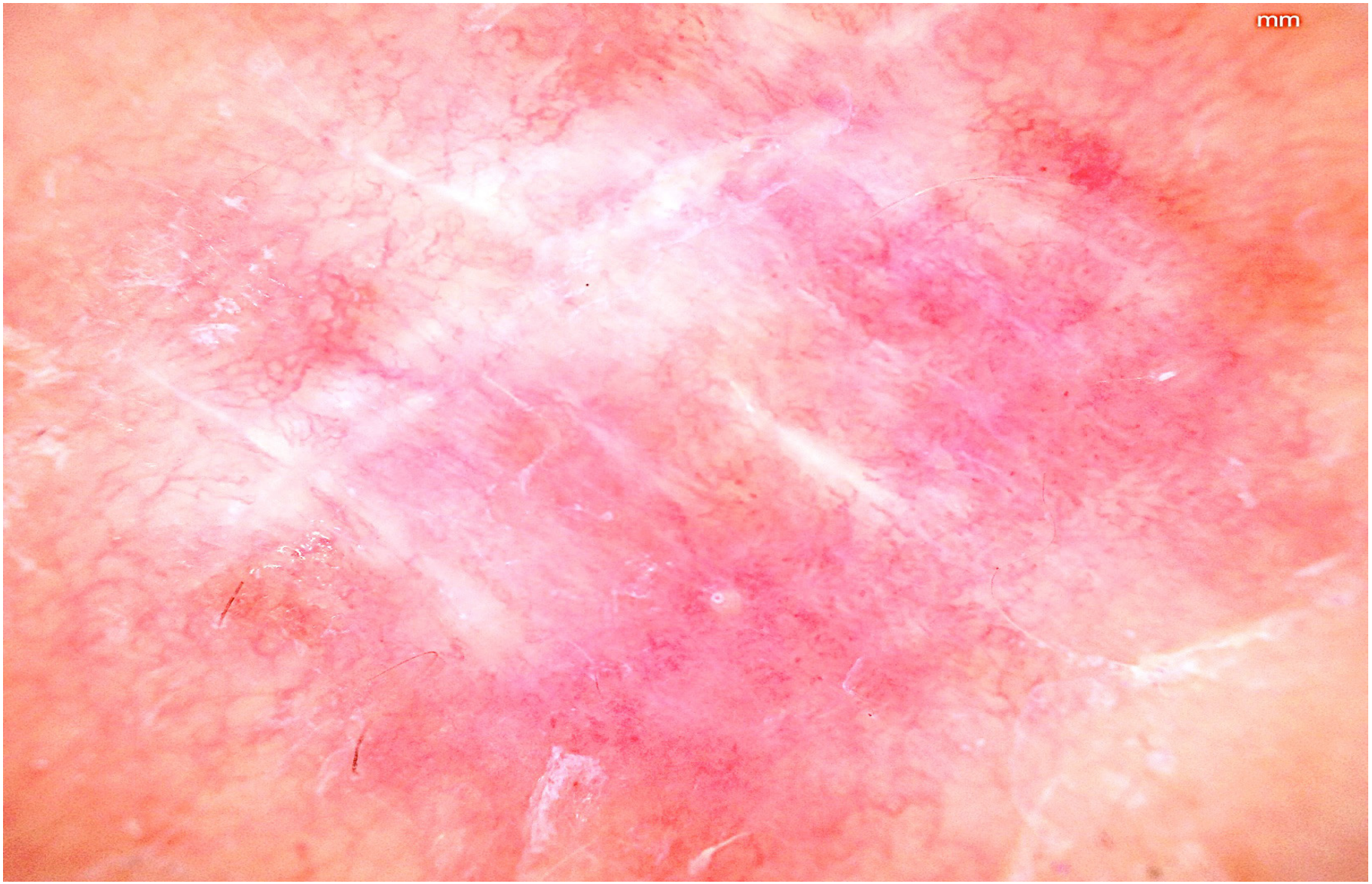


Melanoma in situ

Case



NPD



PD

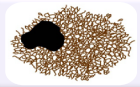
Melanoma Specific Structures

Atypical network, including angulated lines

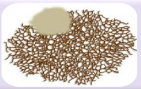
Negative pigment network

Streaks (pseudopods & radial streaming)

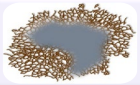
Atypical dots and/or globules



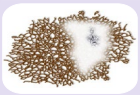
Off-centered blotch



Peripheral tan structureless areas

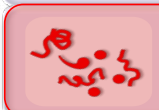


Blue-white veil overlying raised areas



Regression structures

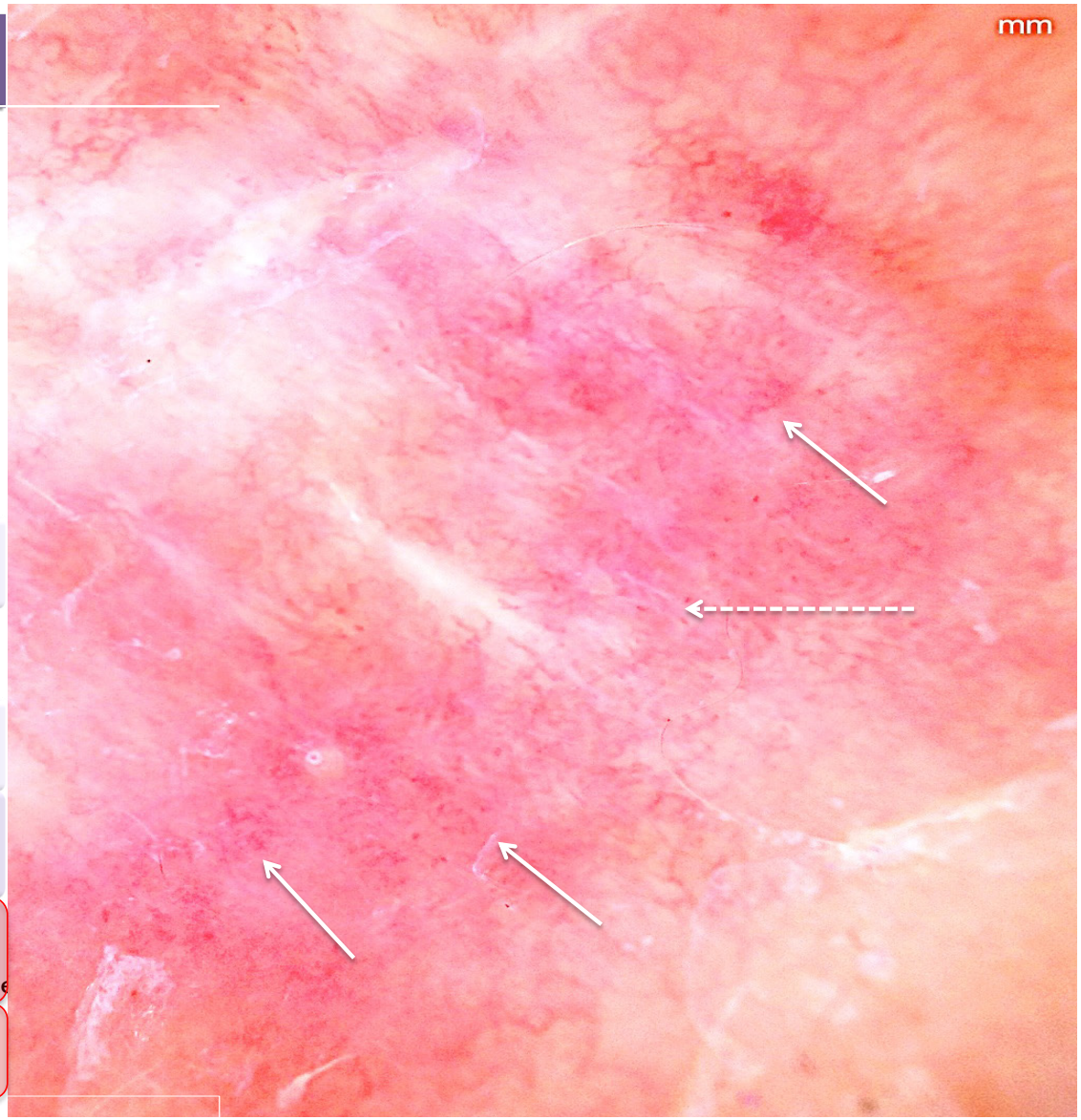
- Blue-white veil overlying macular areas, scar-like areas and/or peppering



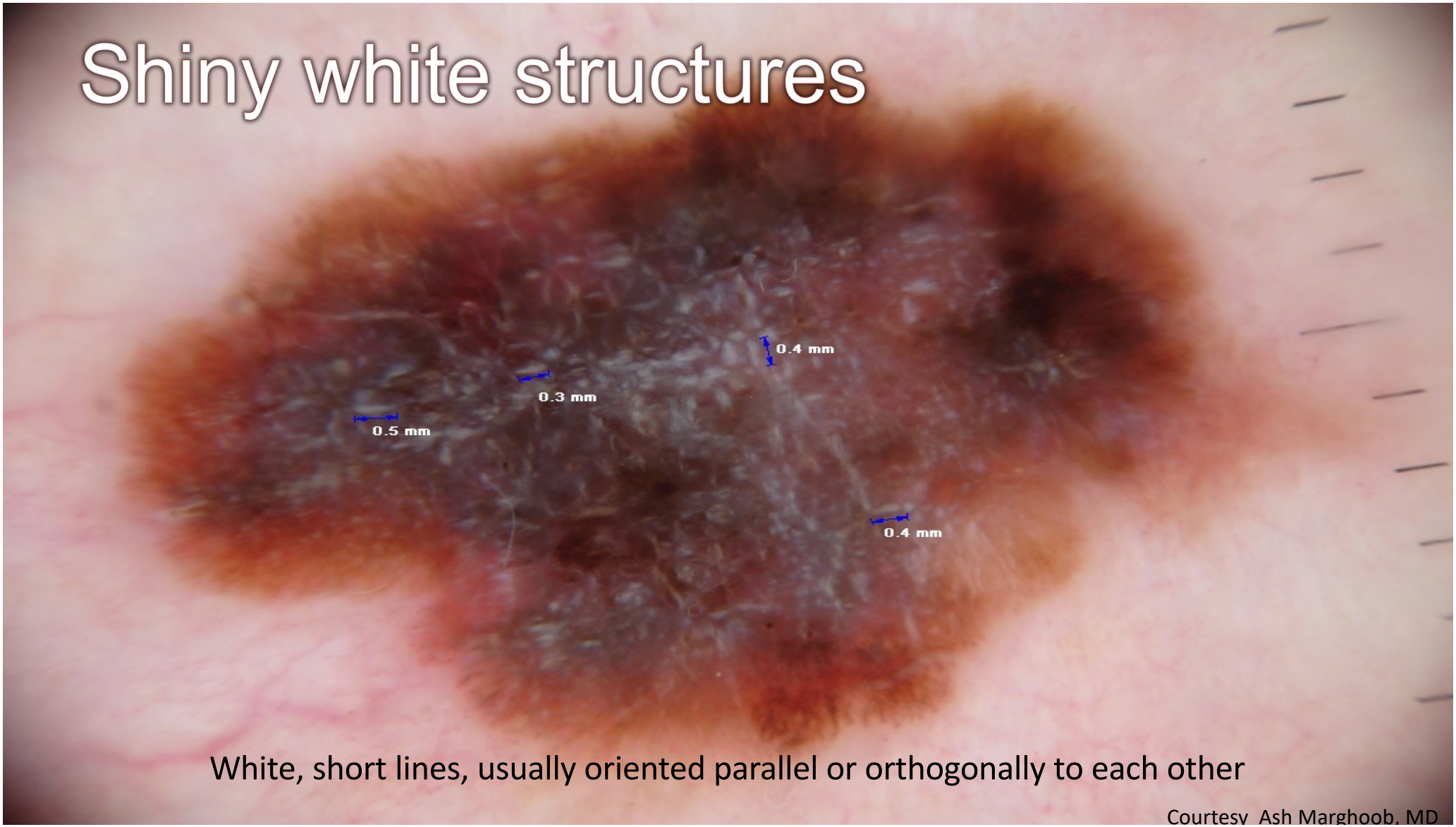
Atypical vascular structures

- Dotted, serpentine, corkscrew, and polymorphous vessels (>1 morphology), milky-red areas, red globule

Shiny white lines (Crystalline structures)



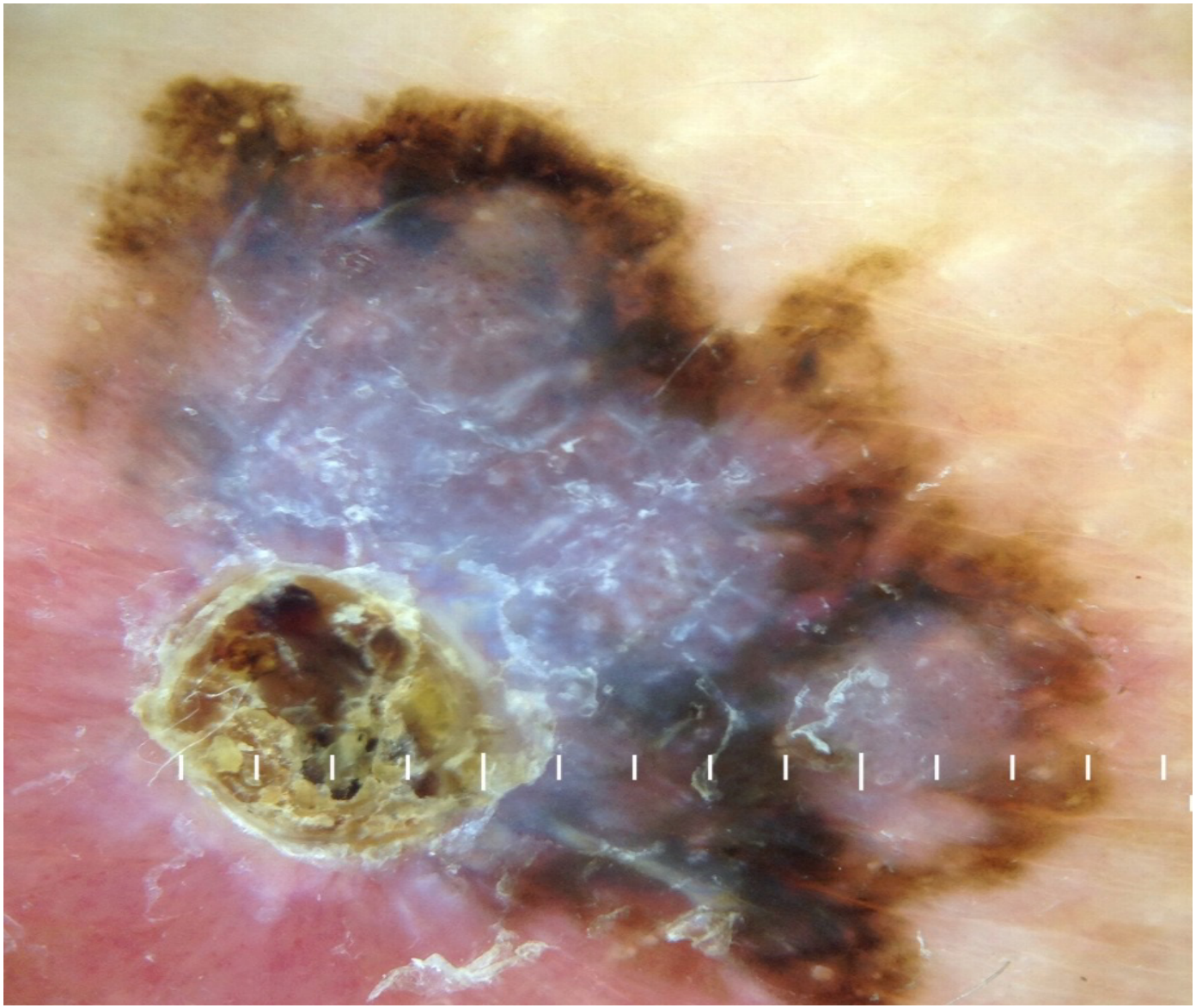
Shiny white structures

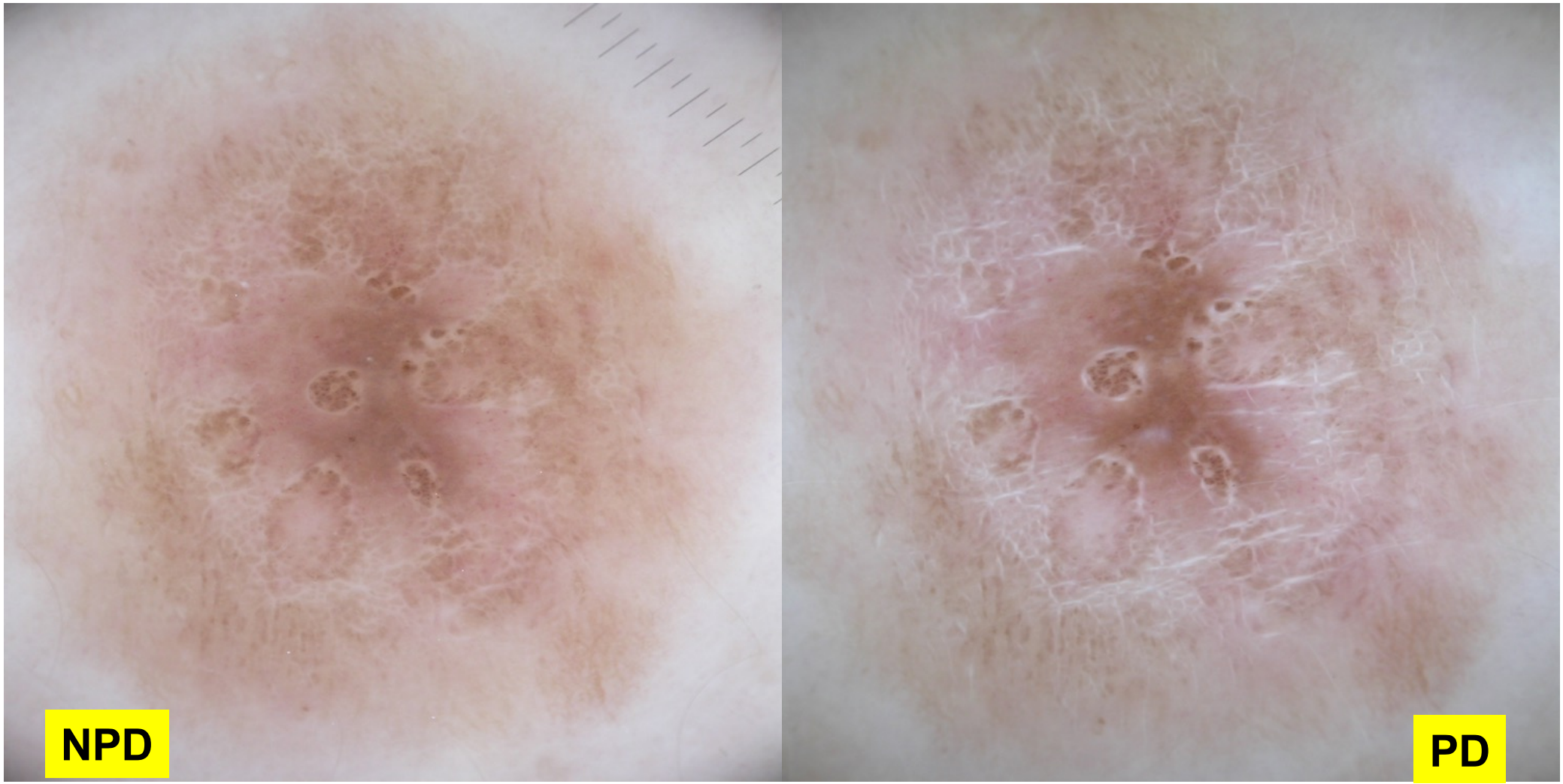


White, short lines, usually oriented parallel or orthogonally to each other

Courtesy Ash Marghoob, MD

Polarized dermoscopy





Courtesy Dr. Marghoob

Table II. Prevalence of crystalline/chrysalis structures by histologic diagnosis for nonmelanocytic and melanocytic lesions

Nonmelanocytic	Crystalline/chrysalis		
	No	Yes	
BCC*	43 (52.4)	39 (47.6)	82 (100)
SK/solar lentigines	27 (84.4)	5 (15.6)	32 (100)
Hemangioma	1 (100.0)	0 (0.0)	1 (100)
SCC/Bowen/KA	35 (87.5)	5 (12.5)	40 (100)
LPLK	7 (46.7)	8 (53.3)	15 (100)
AK	12 (70.6)	5 (29.4)	17 (100)
Scar	0 (0.0)	2 (100.0)	2 (100)
Other—nonmelanocytic	19 (95.0)	1 (5.0)†	20 (100)
Total	144 (68.9)	65 (31.1)	209 (100)

Melanocytic	Crystalline/chrysalis		
	No	Yes	
Invasive melanoma	2 (15.4)	11 (84.6)	13 (100)
MIS	3 (100.0)	0 (0.0)	3 (100)
MM Met	1 (25.0)	3 (75.0)	4 (100)
Spitz	0 (0.0)	3 (100.0)	3 (100)
Clark/DN	19 (95.0)	1 (5.0)	20 (100)
CMN	1 (100.0)	0 (0.0)	1 (100)
IDN	8 (80.0)	2 (20.0)	10 (100)
Other—melanocytic	1 (50.0)	1 (50.0)‡	2 (100)
Total	35 (62.5)	21 (37.5)	56 (100)

AK, Actinic keratosis; *BCC*, basal cell carcinoma; *CMN*, congenital melanocytic nevus; *DN*, dysplastic nevus; *IDN*, intradermal nevus; *KA*, keratoacanthoma; *LPLK*, lichen planuslike keratosis; *MIS*, melanoma in situ; *MM Met*, malignant melanoma cutaneous metastasis; *SCC*, squamous cell carcinoma; *SK*, seborrheic keratosis.

*5 BCCs were treated with Mohs and histologically confirmed to be BCCs without initial biopsy performed.

†Lesion observed with crystalline/chrysalis structures in this category was normal scalp from bald individual.

‡Lesion observed with crystalline/chrysalis structures in this category was traumatized nevus.

Balagula et al. J Am Acad Dermatol 2012

Table V. Differences in tumor thickness and presence of regression by presence or absence of crystalline/chrysalis structures for polarized contact dermatoscopy among retrospectively analyzed lesions

	PCD		
	Crystalline/chrysalis		
	Present	Absent	*P* value
Thickness, mean, (SD)*	0.68 (0.50)	0.43 (0.28)	.001
Thickness, median†	0.55	0.39	.001
Regression	n (%)	n (%)	
Absent	38 (53.5)	121 (67.2)	.04
Present	33 (46.5)	59 (32.8)	

PCD, Polarized contact dermatoscopy.
*Based on Student *t* test.
†Based on Wilcoxon sign rank test.

Balagula et al. J Am Acad Dermatol 2012

Shiny White Lines

Spitz Nevus

Can be seen in Spitz & severe DN. Often distributed in center of lesion.

Melanoma

Often in invasive MM but can also be seen in in situ MM. Distributed focally or throughout lesion.

Shiny White Structures

Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

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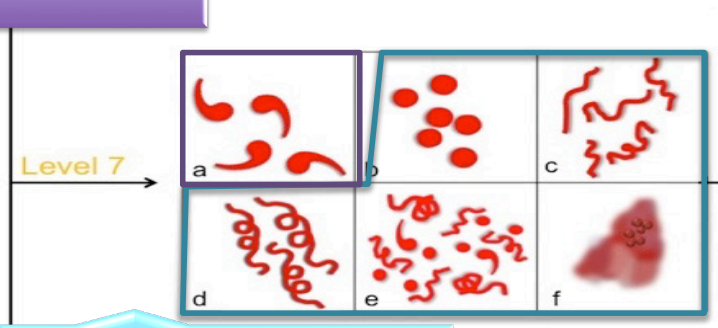
Off-center blotch	16 (12 850)	42.1 (29.6-55.6)	84.1 (74.6-90.5)	3.8 (2.7-5.5)	85.8
Peripheral tan structureless area	12 (8285)	37.5 (22.3-55.7)	76.1 (65.6-84.2)	2.0 (1.3-3.0)	50.4
Peppering	7 (7112)	36.8 (19.1-58.9)	93.4 (81.9-97.8)	6.3 (2.4-16.1)	91.6
Negative network	8 (7011)	34.5 (30.5-38.7)	70.8 (47.0-86.8)	1.3 (0.7-2.4)	79.2
Scarlike areas	8 (7328)	31.3 (16.9-50.5)	89.1 (83.7-92.9)	4.4 (2.7-7.2)	76.0
Shiny white structures	9 (9687)	30.5 (15.8-50.7)	93.6 (85.6-97.3)	6.7 (2.5-17.9)	95.2

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

Typical



Vascular structures in melanocytic tumors

Atypical

Unclassifiable lesion

The clues in most amelanotic and hypomelanotic lesions are ***vascular structures*** and ***shiny white lines***. Some will also reveal ***peripheral tan structureless areas***

Menzies SW, et al. *Arch Dermatol.* Sep 2008;144(9):1120-1127.
Zell D, *Dermatol Surg.* Sep 2008;34(9):1254-1257.

DOI: 10.1111/j.1468-3083.2011.04122.x JEADV

ORIGINAL ARTICLE

Clinical and dermoscopic characteristics of amelanotic melanomas that are not of the nodular subtype

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Abstract

Background Amelanotic melanomas remain challenging to diagnose.

Objective To analyze and describe the clinical and dermoscopic characteristics of amelanotic melanomas that are not of the nodular subtype.

Patients/Methods We conducted a retrospective review of 20 consecutively diagnosed amelanotic melanomas. The clinical and dermoscopic images of pathologically confirmed amelanotic melanomas that were not of the nodular subtype were analyzed. In addition, the clinical diagnosis and the reasons why these lesions were biopsied were examined.

Results All 20 amelanotic melanomas were erythematous and lacked any of the clinical ABCD features commonly attributed to melanoma. The lesions appeared clinically to be relatively symmetric with regular borders and manifesting a circular to oval morphology. Dermoscopically, all lesions manifested polymorphous vascular pattern.

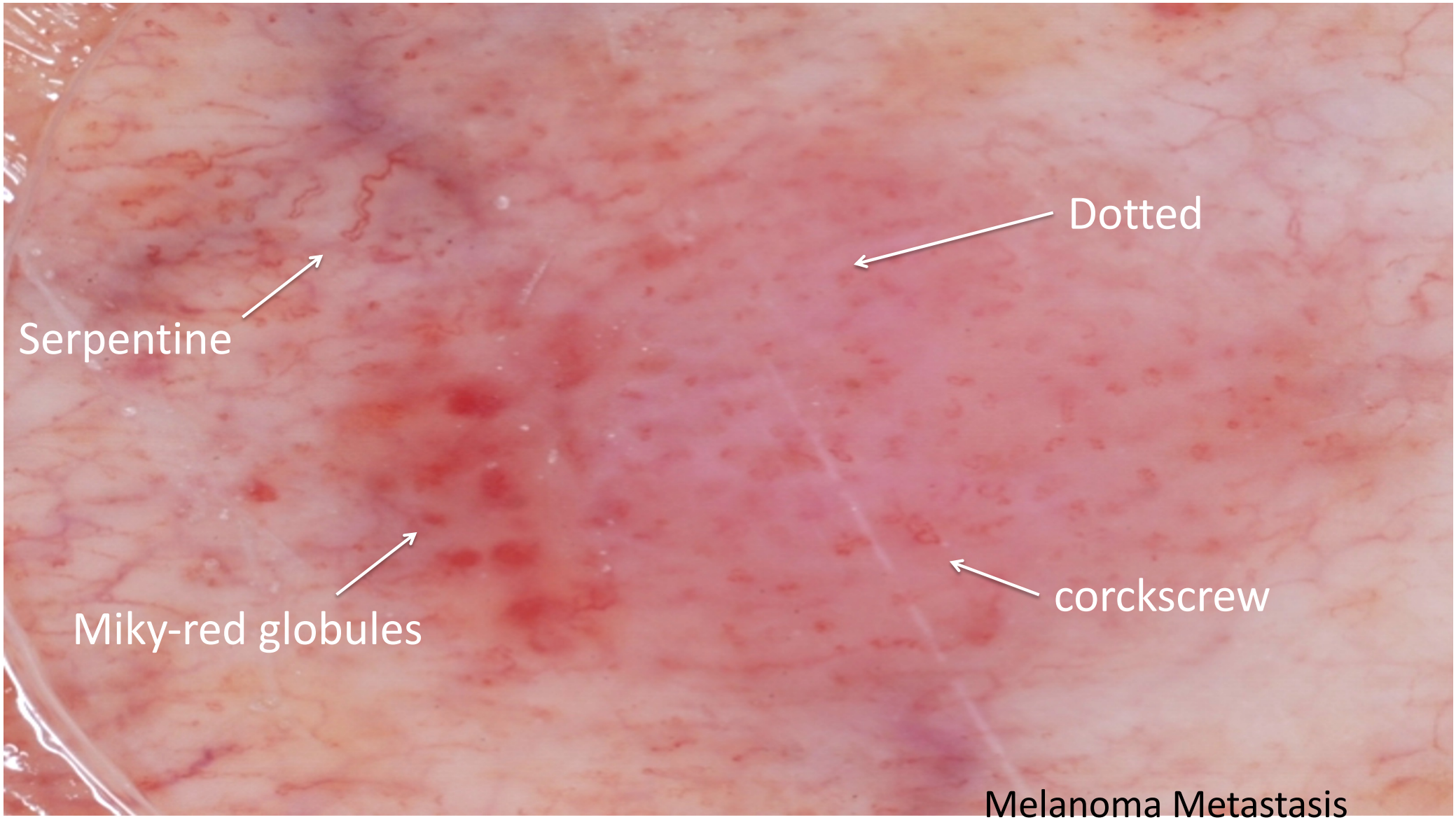
Conclusions Amelanotic melanomas that are not of the nodular subtype often present as clinically symmetric erythematous lesions. Therefore, it is important to consider AMs in the differential diagnosis of isolated and persistent erythematous outlier lesions, even if they are symmetric in appearance. Additionally, the presence of a polymorphous vascular pattern seen with dermoscopy can facilitate in correctly identifying these melanomas.

Received: 28 March 2011; Accepted: 27 April 2011

Table 2 Dermoscopic features of amelanotic melanomas that are not of the nodular subtype (n = 20)

Dermoscopic feature	Total, *n* (%)
Vessels	
Serpentine	17 (85)
Dotted	15 (75)
Linear	7 (35)
Milky red areas/vascular blush	16 (80)
Symmetry	
Mono-axial	2 (10)
Bi-axial	12 (65)
Asymmetry	3 (15)
N/A	2 (10)
Peripheral light brown structureless areas	
Present	11 (55)
Absent	9 (45)

Jaimes N. et al. J Eur Acad Dermatol Venereol. 2012 May;26(5):591-6


Dotted
Serpentine
Miky-red globules
corckscrew
Melanoma Metastasis

Dermoscopic Evaluation of Amelanotic and Hypomelanotic Melanoma

Scott W. Menzies, MB, BS, PhD; Juergen Kreusch, PhD, MD; Karen Byth, PhD; Maria A. Pizzichetta, MD; Ashfaq Marghoob, MD; Ralph Braun, MD; Josep Malvehy, MD; Susana Puig, MD; Giuseppe Argenziano, MD; Iris Zalaudek, MD; Harold S. Rabinovitz, MD; Margaret Oliviero, ARNP; Horacio Cabo, MD; Verena Ahlgrimm-Siess, MD; Michelle Avramidis, BSc; Pascale Guitera, MD; H. Peter Soyer, MD; Giovanni Ghigliotti, MD; Masaru Tanaka, MD; Ana M. Perusquia, MD; Gianluca Pagnanelli, MD; Riccardo Bono, MD; Luc Thomas, MD, PhD; Giovanni Pellacani, MD; David Langford, MB, ChB; Domenico Piccolo, MD; Karin Terstappen, MD; Ignazio Stanganelli, MD; Alex Llambrich, MD; Robert Johr, MD

Objective: To determine the predictive dermoscopic features of amelanotic and hypomelanotic melanoma.

Design: A total of 105 melanomas (median Breslow thickness, 0.76 mm), 170 benign melanocytic lesions, and 222 nonmelanocytic lesions lacking significant pigment (amelanotic, partially pigmented, and light colored) were imaged using glass-plate dermoscopy devices and scored for 99 dermoscopic features. Diagnostic models were derived from and tested on independent randomly selected lesions.

Setting: Predominantly hospital-based clinics from 5 continents.

Main Outcome Measures: Sensitivity, specificity, and odds ratios for individual features and models for the diagnosis of melanoma and malignancy.

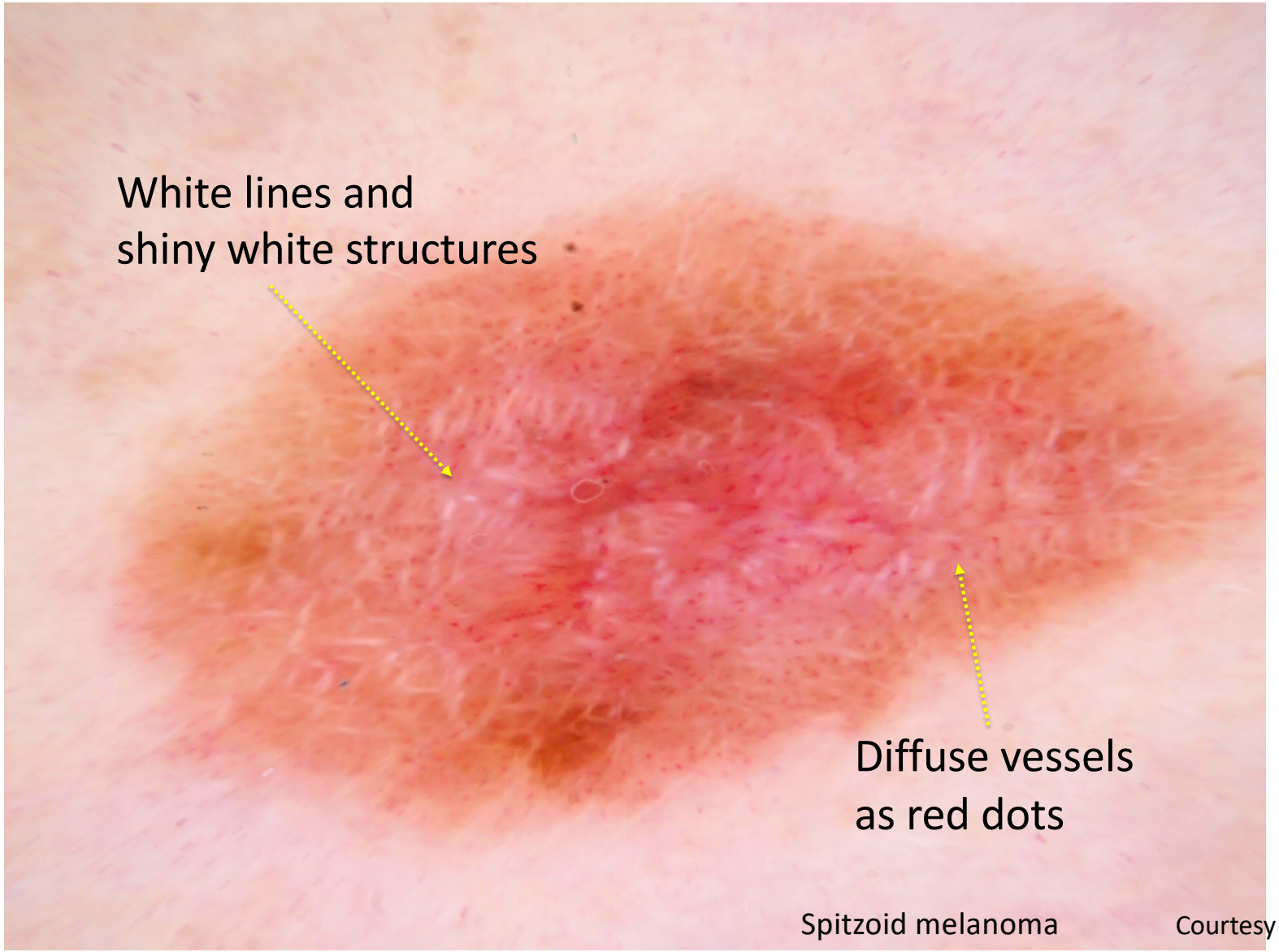
Results: The most significant negative predictors of melanoma were having multiple (>3) milialike cysts (odds ratio, 0.09; 95% confidence interval, 0.01-0.64), comma vessels with a regular distribution (0.10; 0.01-0.70), comma vessels as the predominant vessel type (0.16; 0.05-0.52), symmetrical pigmentation pattern (0.18; 0.09-0.39), irregular blue-gray globules (0.20; 0.05-0.87), and multiple blue-gray globules (0.28; 0.10-0.81). The most significant positive predictors were having a blue-white veil (odds ratio,13; 95% confidence interval, 3.9-40.0), scarlike depigmentation (4.4; 2.4-8.0), multiple blue-gray dots (3.5; 1.9-6.4), irregularly shaped depigmentation (3.3; 2.0-5.3), irregular brown dots/globules (3.2; 1.8-5.6), 5 to 6 colors (3.2; 1.6-6.3), and predominant central vessels (3.1; 1.6-6.0). A simple model distinguishing melanomas from all nonmelanomas had a sensitivity of 70% and a specificity of 56% in the test set. A model distinguishing all malignant lesions from benign lesions had a sensitivity of 96% and a specificity of 37%.

Conclusion: Although the diagnostic accuracy of dermoscopy for melanoma lacking significant pigment is inferior to that of more pigmented lesions, features distinguishing the former from benign lesions can be visualized on dermoscopic evaluation.

Arch Dermatol. 2008;144(9):1120-1127

Table 7. Simple Dermoscopic Model for the Diagnosis of Melanoma Lacking Significant Pigment[a]

Negative feature (if present, nonmelanoma)
>3 Milialike cysts
Positive features (if any 1 present, then melanoma)
Irregularly sized or distributed brown dots/globules
Multiple blue/gray dots
Irregularly shaped depigmentation
Blue-white veil
>1 Shade of pink
Predominant central vessels
Dotted and linear irregular vessels



Spitzoid melanoma

Courtesy Dr. Rabinovitz

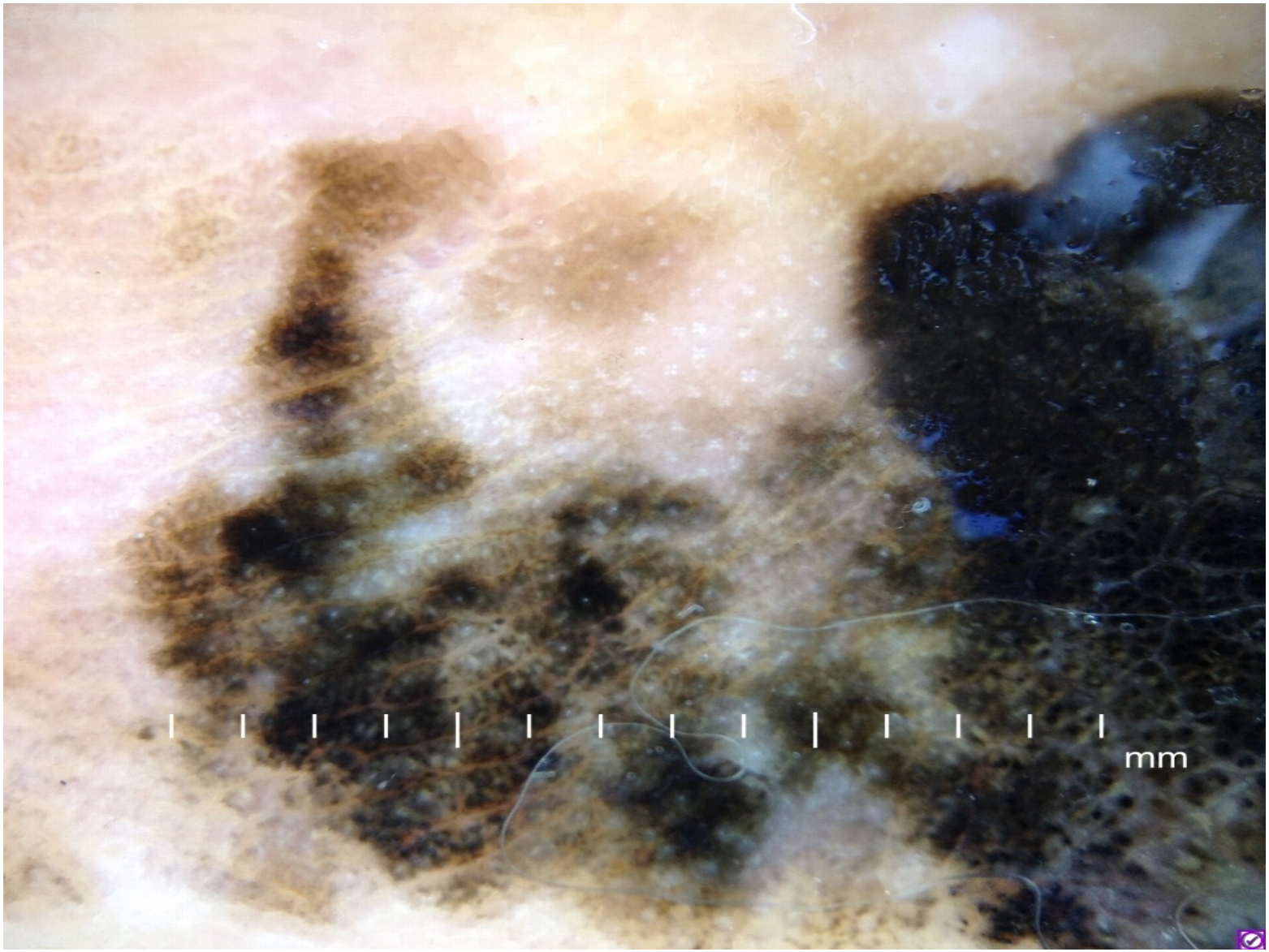
Atypical vessles

Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Linear irregular vessels	5 (1806)	23.2 (9.7-46.0)	86.8 (74.3-93.7)	2.1 (1.3-3.6)	61.0
Linear irregular vessels and polymorphous/atypical vessels	18 (11 284)	22.1 (14.6-32.1)	81.6 (83.7-91.9)	2.3 (1.7-3.1)	35.8
Polymorphous/atypical vessels	17 (11 505)	21.9 (13.3-33.8)	89.0 (83.6-93.0)	2.4 (1.7-3.4)	80.6
Streaks	18 (11 035)	21.1 (14.0-30.4)	92.1 (88.4-94.7)	3.1 (2.2-4.5)	77.5
Streaks and pseudopods	18 (11 035)	19.3 (13.9-26.2)	83.8 (91.0-95.7)	3.4 (2.6-4.6)	38.1
Pseudopods	7 (6751)	15.4 (8.8-25.6)	97.3 (94.3-98.7)	6.7 (2.7-16.1)	70.3

Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021

CASE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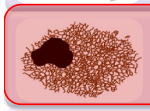
Melanoma Specific Structures

Atypical network, including angulated lines

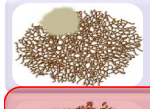
Negative pigment network

Streaks (pseudopods & radial streaming)

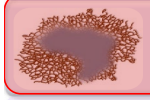
Atypical dots and/or globules



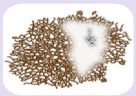
Off-centered blotch



Peripheral tan structureless areas



Blue-white veil overlying raised areas



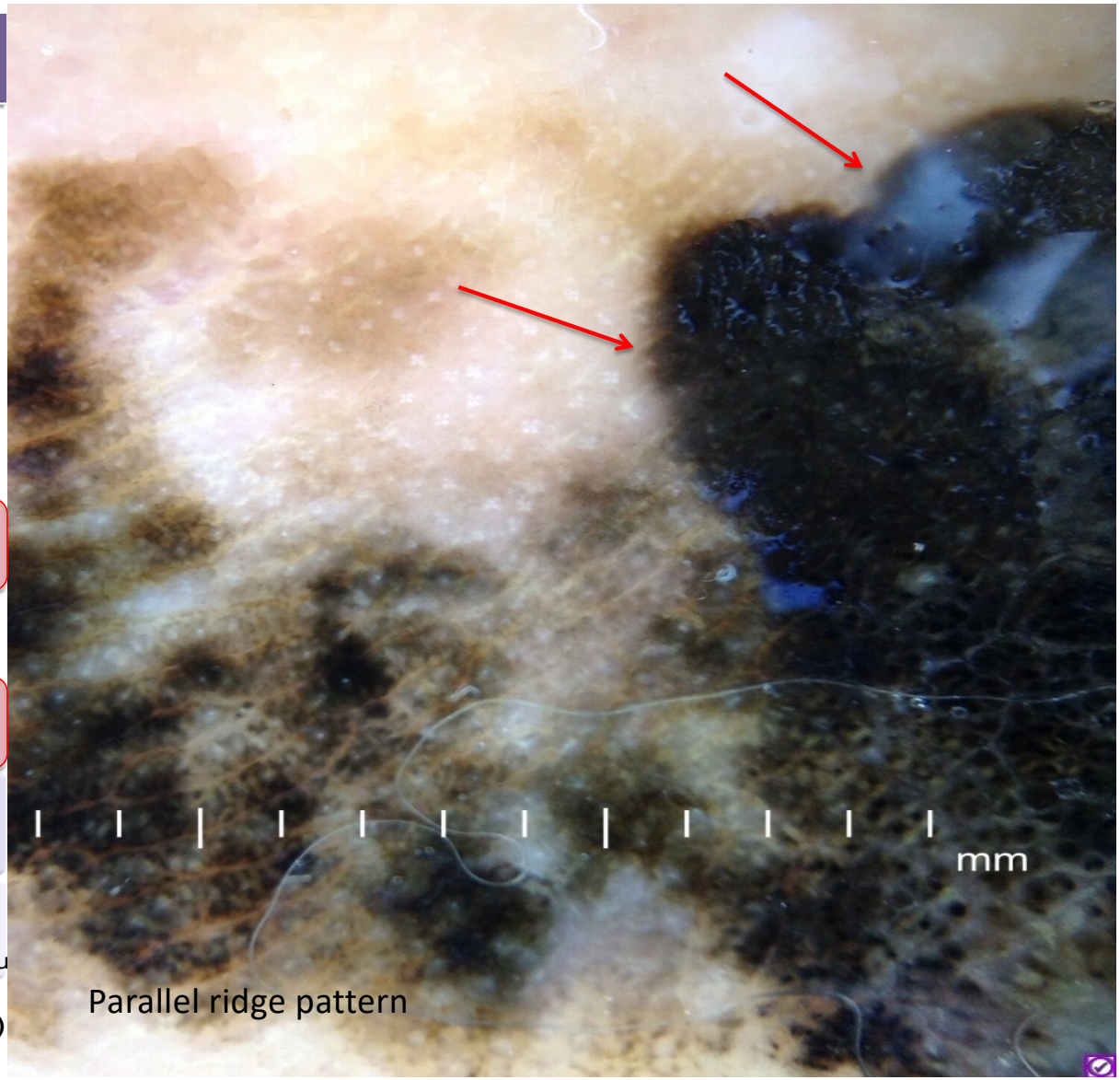
Regression structures

- Blue-white veil overlying macular areas, scar-like areas and/or peppering

Atypical vascular structures

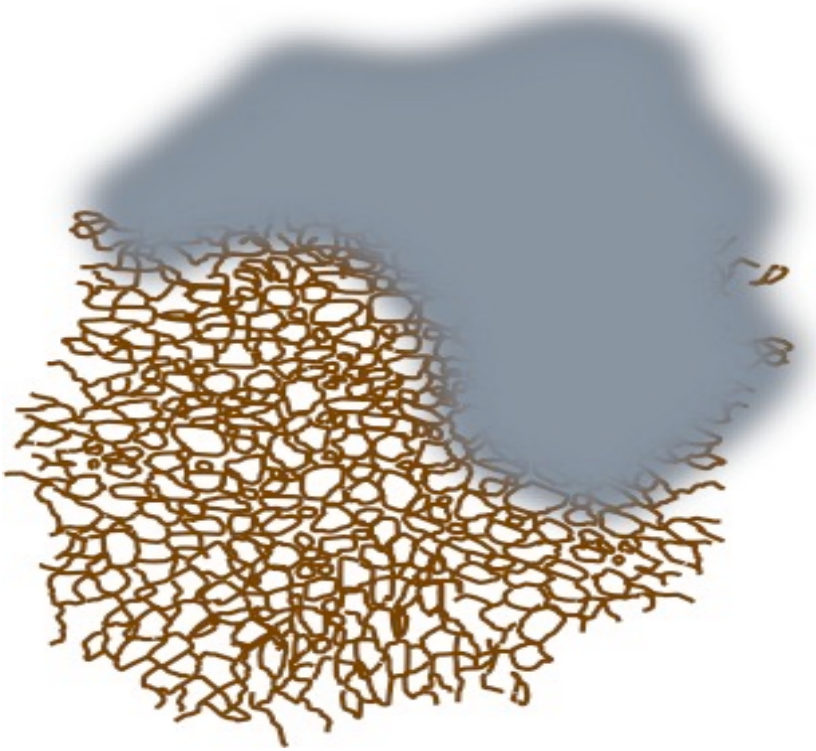
- Dotted, serpentine, corkscrew, and polymorphous vessels (>1 morphology), milky-red areas, red globu

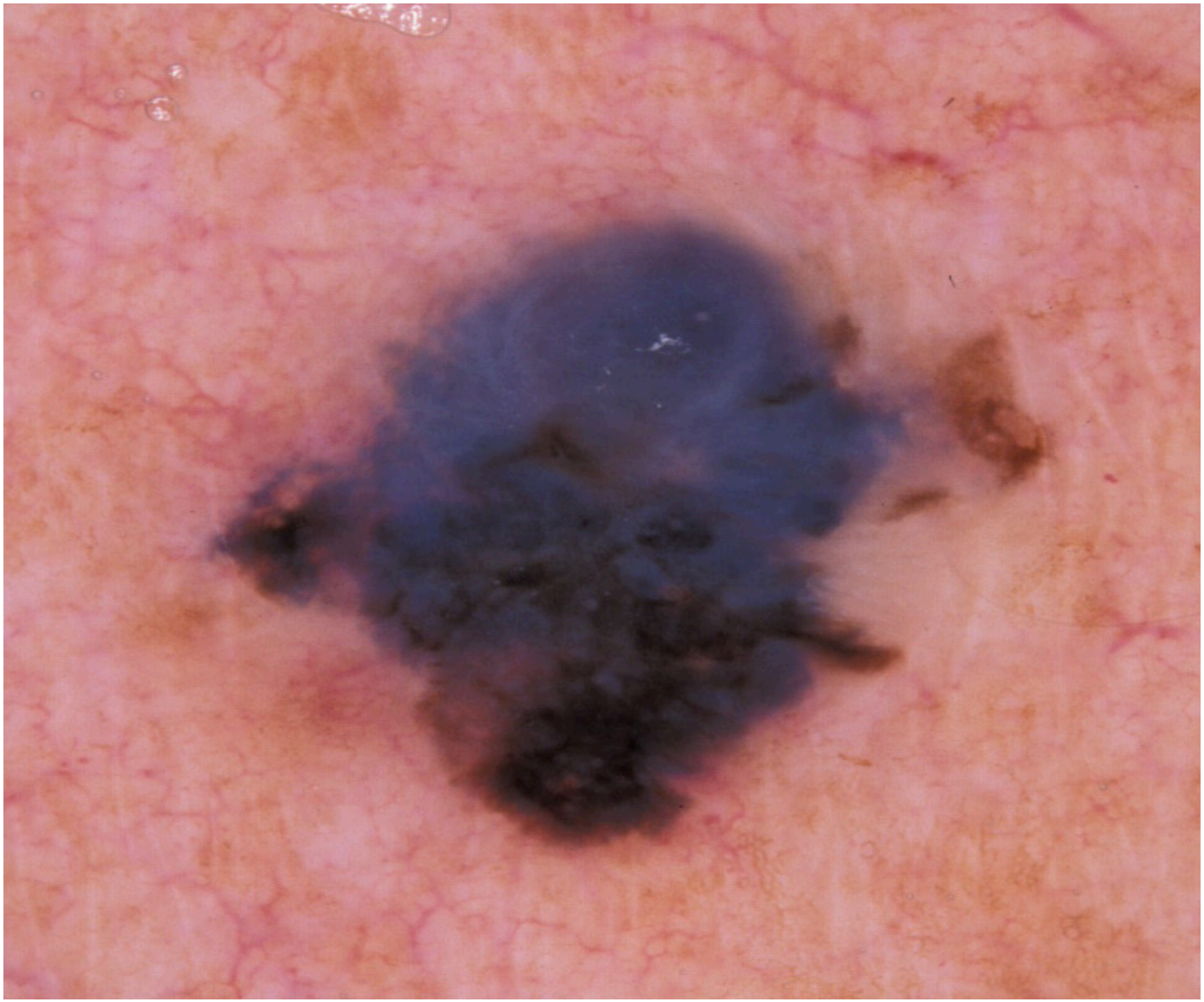
Shiny white lines (Crystalline structures)

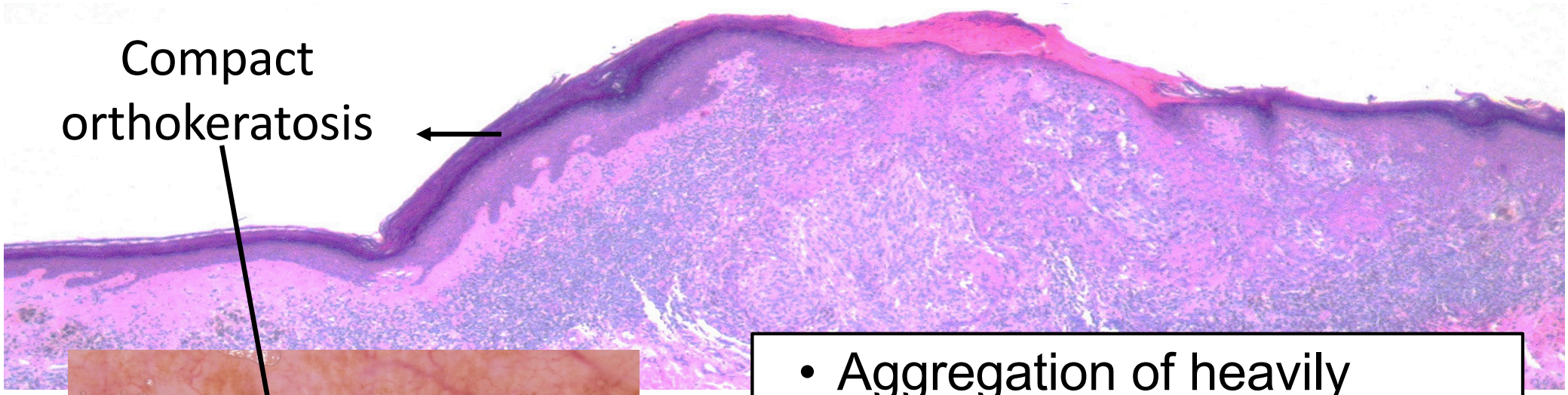


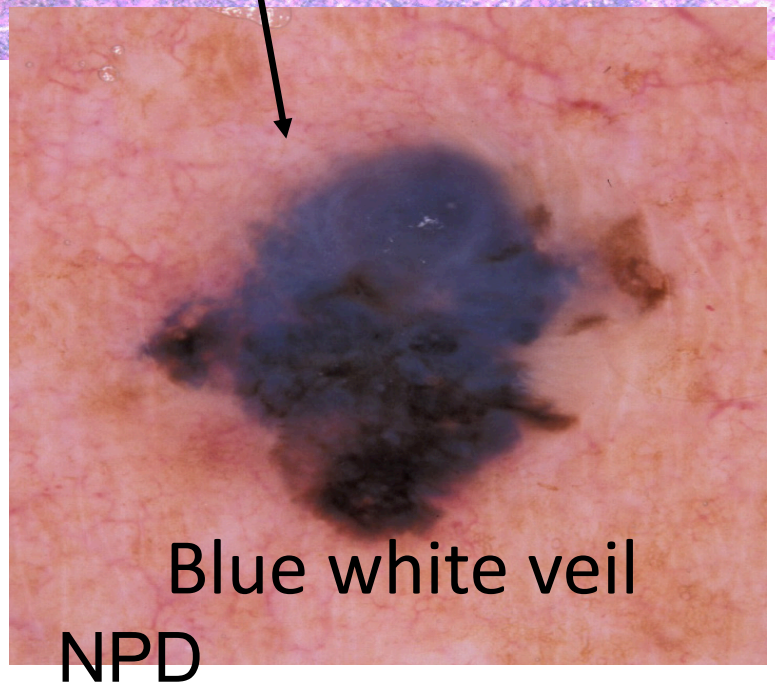
Blue White Veil

- confluent blue pigmentation with overlying white ground– glass haze
- raised palpable portion of the lesion







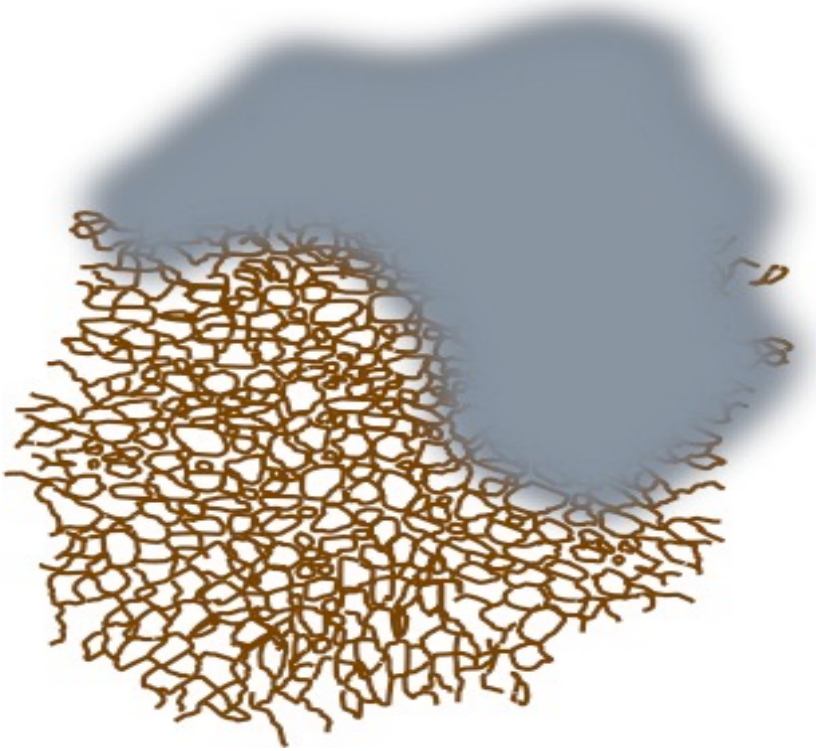


NPD

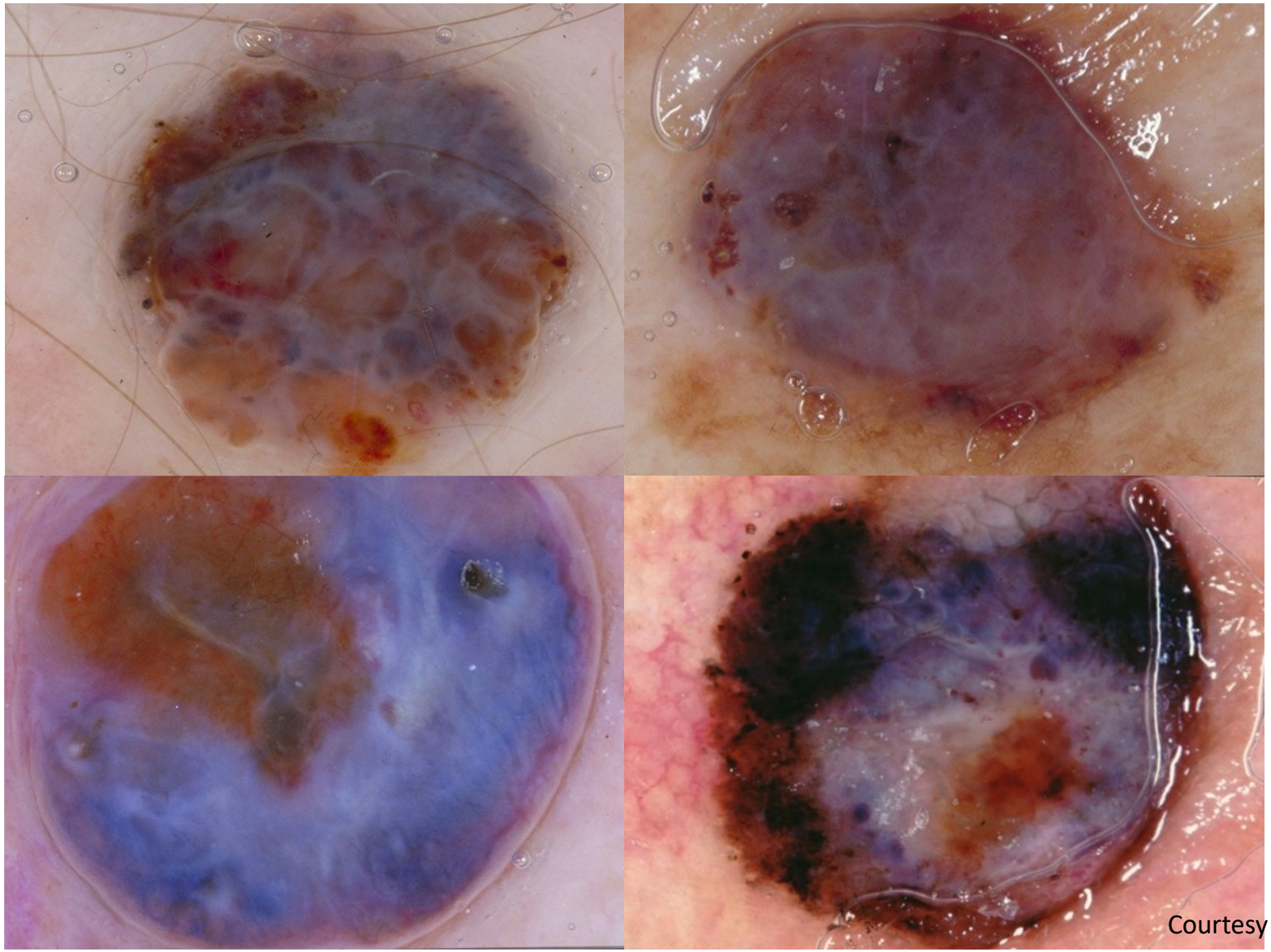
- Aggregation of heavily pigmented cells and/or melanophages in combination with compact orthokeratosis of the stratum corneum

Blue White Veil

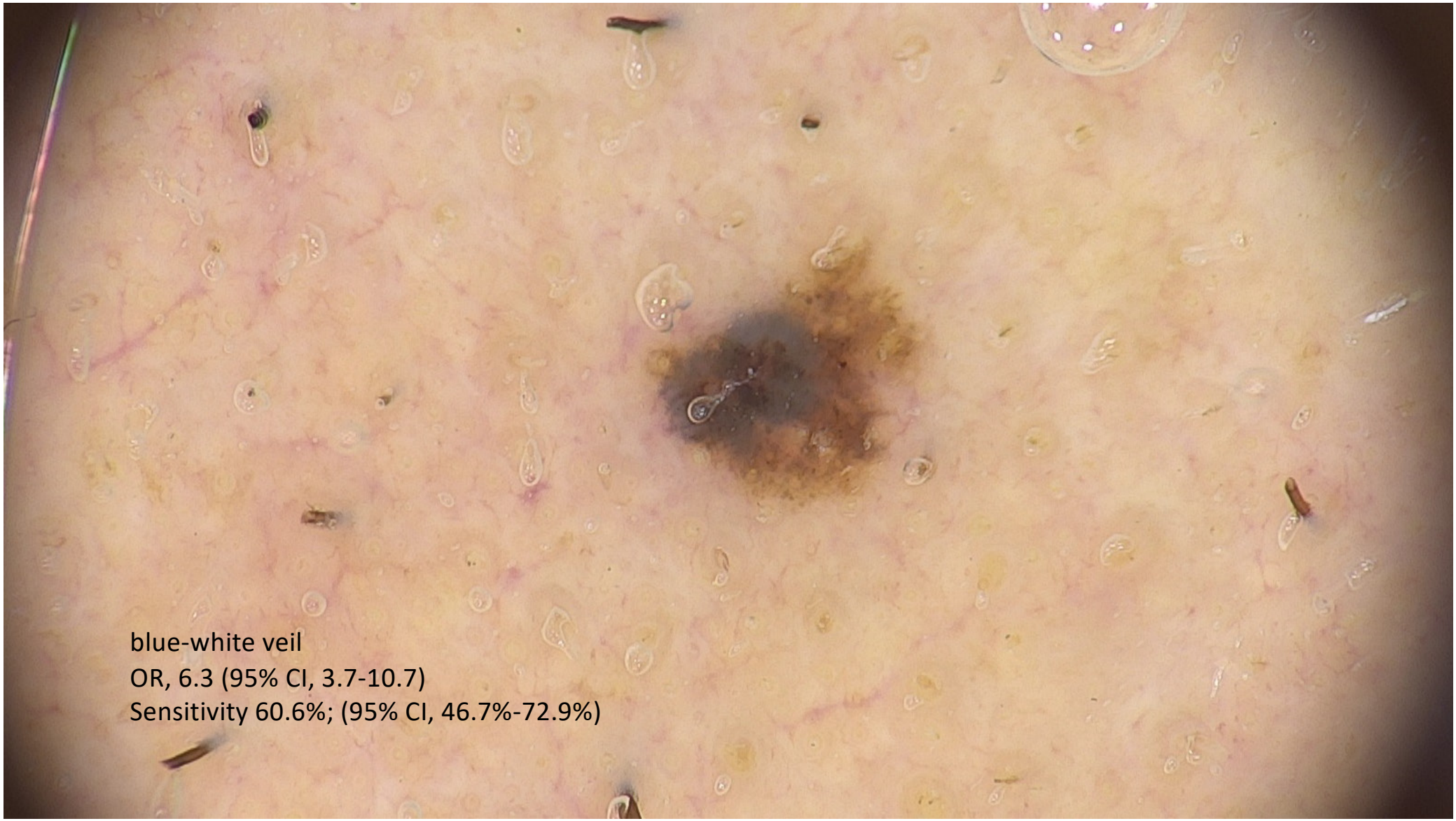
- BWV is **not**:
  - –in the entire lesion
  - –Associated with regression structures



- OR, 6.3 (95% CI, 3.7-10.7)
- Sensitivity 60.6%; (95% CI, 46.7%-72.9%)



Courtesy Dr. Rabinovitz

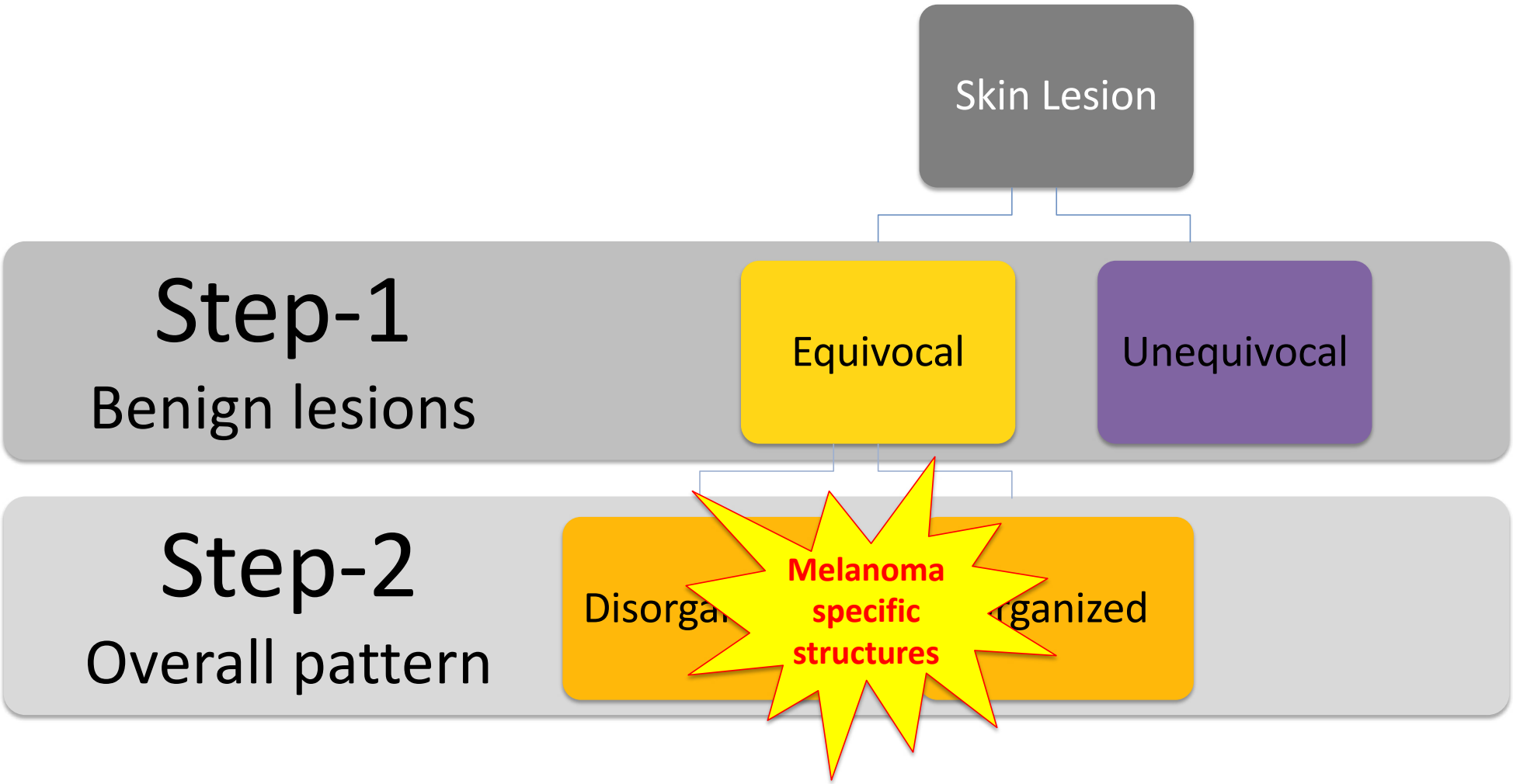

blue-white veil
OR, 6.3 (95% CI, 3.7-10.7)
Sensitivity 60.6%; (95% CI, 46.7%-72.9%)

Atypical vessles

Table 3. Diagnostic Accuracy and Odds Ratio of Each Melanoma-Specific Dermoscopic Structure and/or Pattern From Highest to Lowest Sensitivity

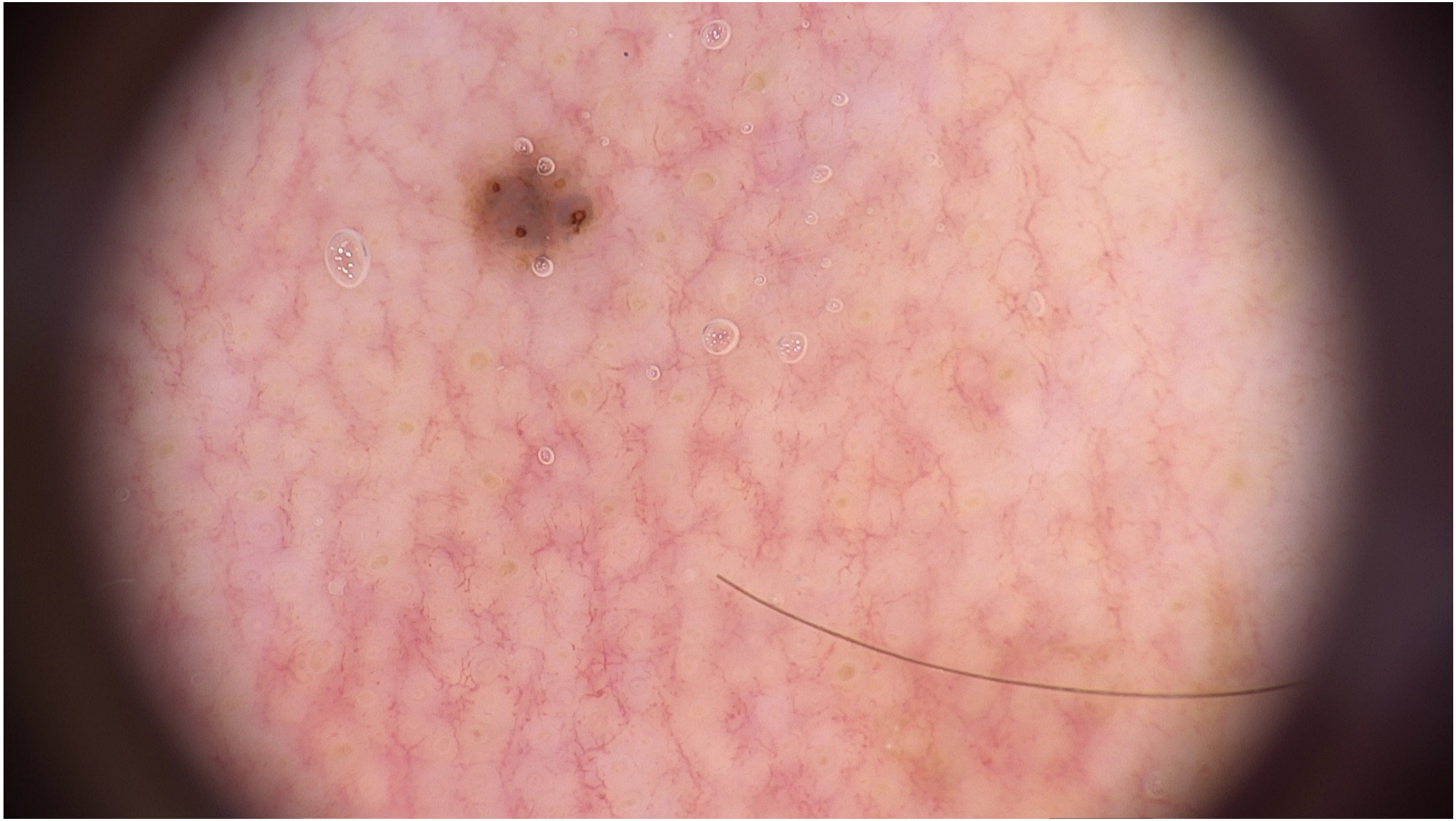
Structure	No. of studies (lesions)	% (95% CI)		Odds ratio (95% CI)	I^2, %
		Sensitivity	Specificity		
Irregular pigmentation	5 (1226)	62.3 (31.2-85.8)	78.6 (57.6-90.8)	6.4 (2.0-20.5)	87.9
Blue-white veil	17 (10 128)	60.6 (46.7-72.9)	79.7 (71.8-85.9)	6.3 (3.7-10.7)	89.0
Atypical network	19 (11 787)	56.8 (43.6-69.2)	71.8 (59.9-81.3)	3.3 (2.4-4.5)	83.8
Multicomponent pattern	9 (12 299)	53.7 (40.4-66.4)	82.4 (72.2-89.4)	5.6 (2.4-13.0)	96.6
Atypical dots and/or globules	17 (5497)	49.7 (37.8-61.8)	73.0 (61.8-81.9)	2.7 (1.8-4.1)	85.1

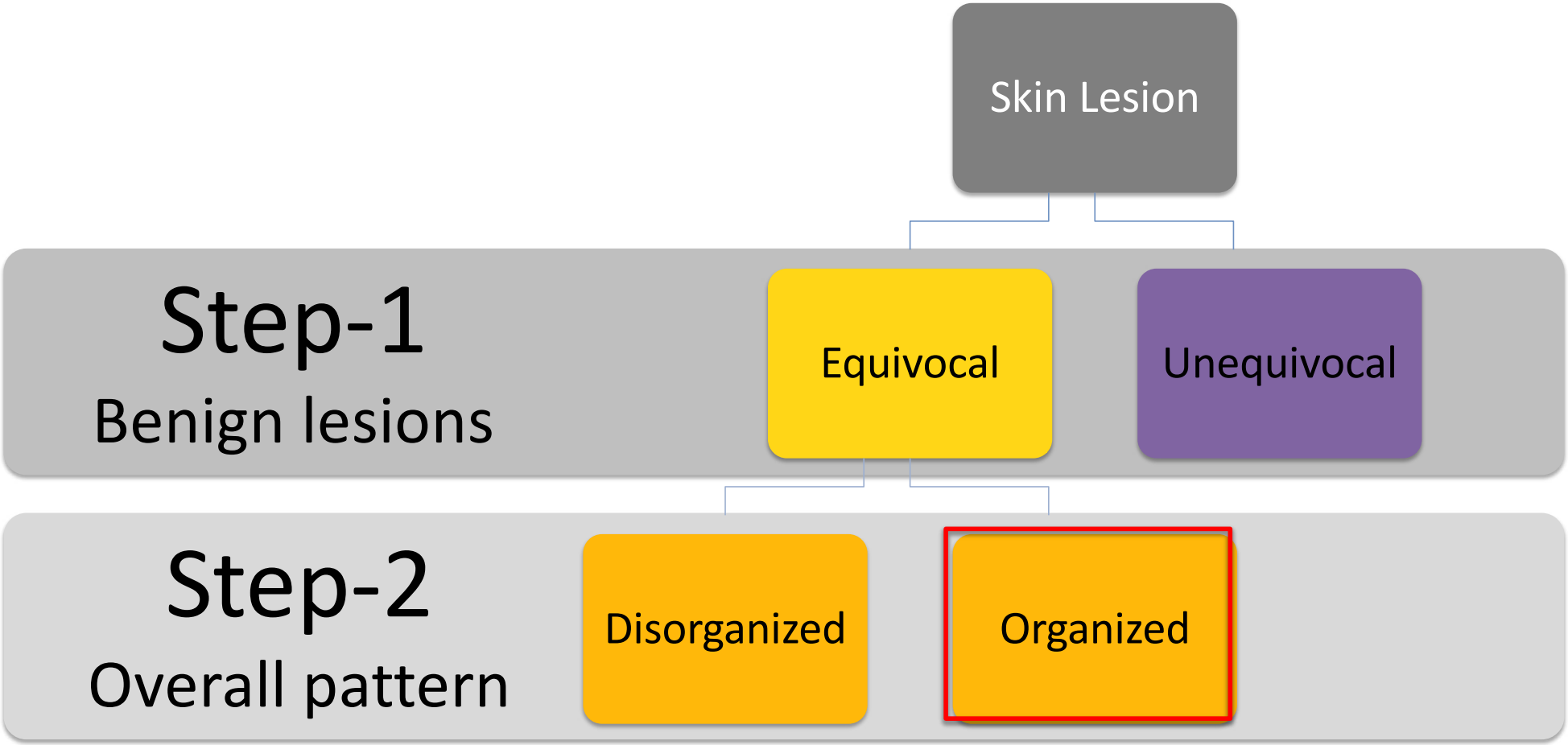
Williams N, Rojas KD, Reynolds JM, Kwon D, Shum-Tien J, Jaimes N. JAMA Dermatol, 2021


Skin Lesion
Step-1
Benign lesions
Equivocal
Unequivocal
Step-2
Overall pattern
Disorga
rganized
Melanoma specific structures

Last case

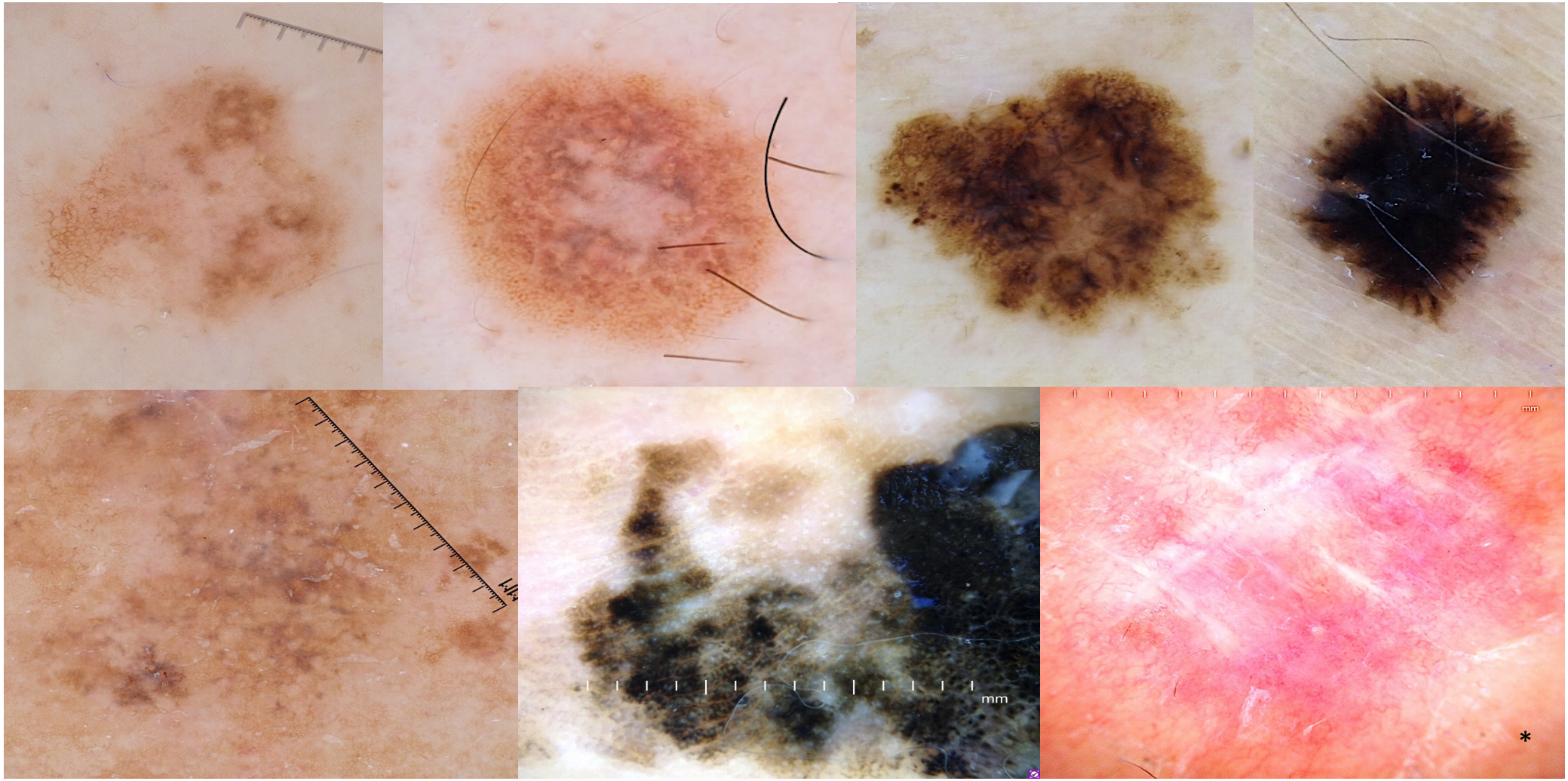
[44]




Skin Lesion
Step-1
Benign lesions
Equivocal
Unequivocal
Step-2
Overall pattern
Disorganized
Organized

Dermoscopy for the not faint hearted
Saturday, July 2, 2022
11:30 – 12:00pm
Dr. Marghoob
TUNED!

In Summary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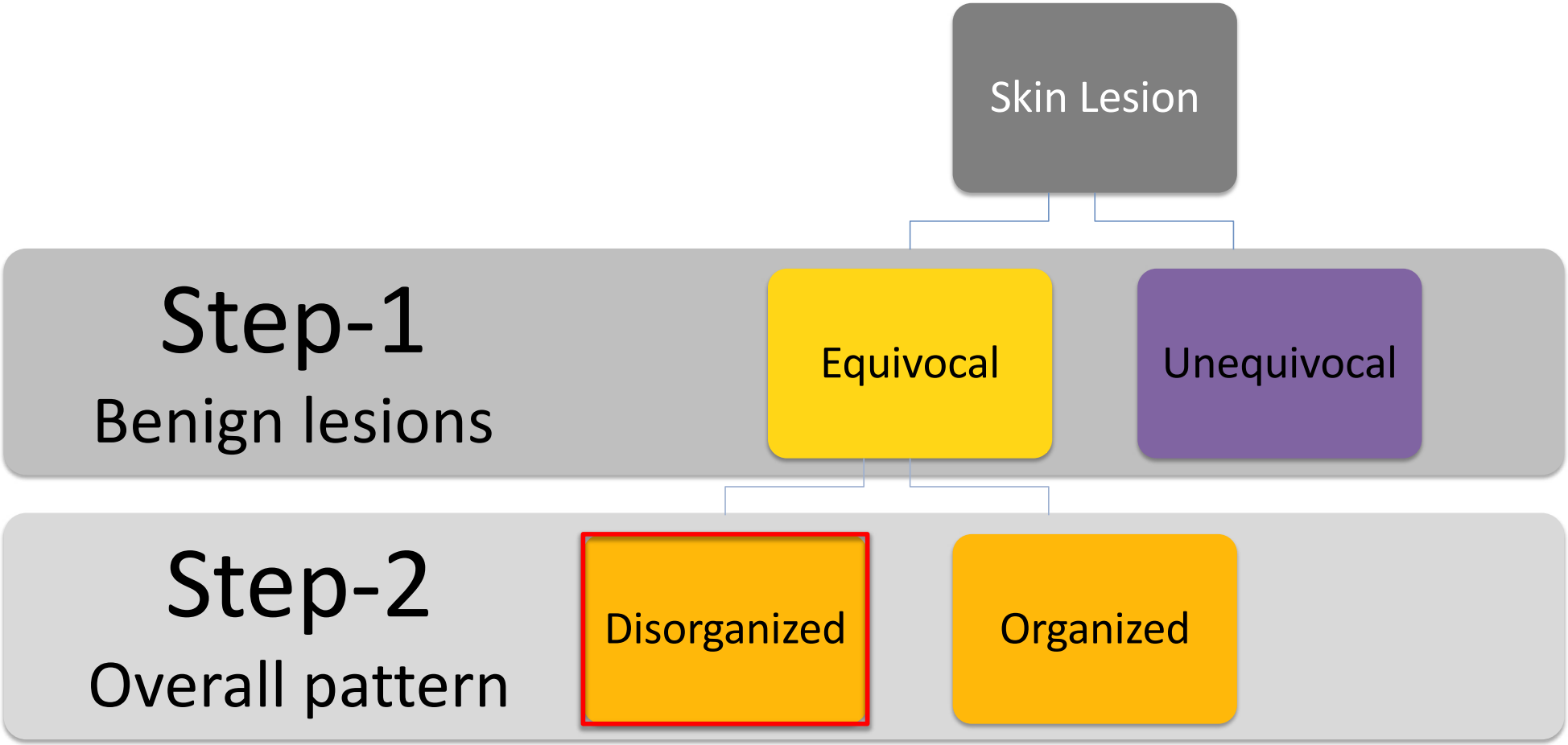
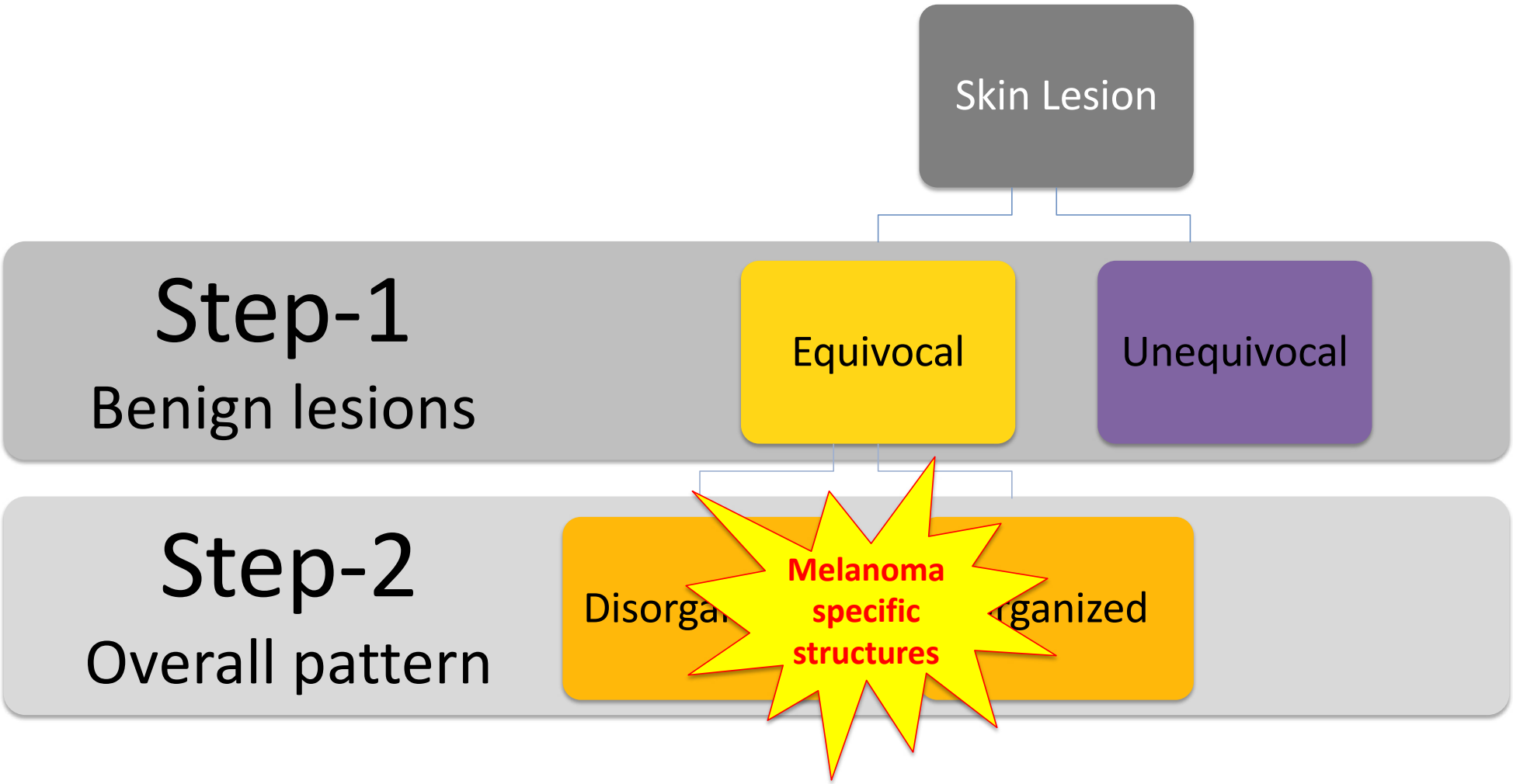

Skin Lesion
Step-1
Benign lesions
Equivocal
Unequivocal
Step-2
Overall pattern
Disorganized
Organized


Skin Lesion
Step-1
Benign lesions
Equivocal
Unequivocal
Step-2
Overall pattern
Disorga
rganized
Melanoma specific structures

Subtypes of Melanoma

Chronic sun-damaged skin (CSD)

- Melanoma on sun-damaged skin
- Desmoplastic melanoma

Non sun-damaged skin (NSD) (Intermittent sun exposure)

- Melanoma in association with nevi
- De novo melanoma
- Nodular or rapidly growing melanoma
- Shade of pink melanoma
- Spitzoid melanoma
- Nevoid melanoma

Acral melanoma

Mucosal melanoma

Dermal melanoma

Adapted from Bastian BC Annu Rev Pathol Mech Dis 2014, 9:239-71

KEEP
CALM
IT'S
TIME TO PLAY
THE Kahoot!

We only get to play this game one time, one life.
Gary Vaynerchuk
quotefancy