Dermoscopy
Michelle Tarbox, MD
Assistant Professor of Dermatology and Dermatopathology

I have no conflicts of interest to disclose
Except that I LOVE dermoscopy
Diagnostic Algorithm

To be or not to be...
Pigmented or non-pigmented...
Melanocytic or non-melanocytic...

Melanocytic Seborrheic Keratosis
Pigmented BCC
Hemangioma
Amelanotic Melanoma

BCC
AK/Bowens
Dermal nevi
Dermatofibroma
Melanocytic
Non-melanocytic
Melanocytic
Non-melanocytic

Pattern analysis
ABCDEF rule
7 point checklist
Menzies method
Revised pattern analysis

Dermoscopy Method for Pigmented Lesions: Step 1
- Melanocytic
  - Lentigo
  - Nevus
  - Melanoma
- Non-melanocytic
  - Seborrheic Keratosis
  - Pigmented basal cell carcinoma
  - Hemangioma/angrokeratoma
  - Dermatofibroma
**Melanocytic lesion**

- Pigment network
- Aggregated brown or black globules
- Pseudopods or radial streaming
- Homogeneous blue pigmentation
- Parallel ridge pattern (on palms/soles)
- Patternless pattern

**Pigment network**

- Melanin pigment in keratinocytes or melanocytes
- Network
  - Grid of thin brown lines (rete)
  - Lighter holes (dermal papillae)
Pigment Pseudo-Network
- Pseudo-network on face, palms, and soles
- Junctional pigment outlining adnexal structures

Pigment network
- Benign lesions
- Slow growing
- Uniform network pattern
- In melanoma, cells obliterate normal anatomy
- Can stuff the rete pegs
  - Enlarged/disrupted network
  - Can stream out from periphery
  - Radial streaming or pseudopods
Regular honeycomb-like pigment network:
• Fades gradually toward the periphery
• Histology reveals long pigmented rete ridges
• Melanocytic nests situated at the tips of the rete

Irregular pigment network:
“Holes” are due to follicles disrupting network ≠ regression

Perifollicular pigment dropout
Irregular pigment network

Regular pigment pseudo-network

Regular pigment pseudo-network

Regular pigment pseudo-network
Irregular pigment pseudo-network

Aggregated brown / black globules

- Symmetric, round to oval well demarcated structures
- Diameter > 0.1 mm
- Nests of benign or malignant melanocytes
- Benign—regular size, shape, and distribution, central
  - Variant in young patients with symmetric peripheral distribution
- Malignant—vary in size and shape, irregularly distributed at the periphery

Nests of benign or malignant melanocytes

Benign—regular size, shape, and distribution, central
- Variant in young patients with symmetric peripheral distribution

Malignant—vary in size and shape, irregularly distributed at the periphery
Aggregated brown globules, irregular

Peripheral globular pattern
Acceptable in young patients

Intraepidermal or junctional confluent melanocytic nests
Connected to pigment network or tumor body
One of the most specific features of SSMM

Pseudopods / Radial streaming

YOU SHALL NOT PASS WITHOUT PICKING ME UP!!!
Spitz/Reed Nevus

- Starburst pattern with symmetric silhouette
- Central hyperpigmentation (black lamella)
- Pigment within the stratum corneum
- Rim of pigmented streaks regularly distributed at periphery
- Junctional nests of melanocytes at periphery
Blue nevus
- Deep-sited pigmentation = blue color
- Homogenous steel-blue pigmentation
  - No local dermoscopic features
- Dermal proliferation of dendritic melanocytes

Blue nevus

Homogeneous blue pigmentation

Acral Skin Specific Dermoscopic Features
- Reflect the peculiar distribution of pigment along the dermatoglyphics
Parallel-furrow pattern

- Nest of melanocytes at the furrows
- Respecting the normal anatomy of the skin
- Acrosyringia may be visible as “strings of pearls”

Parallel-ridge pattern

- Highly specific to acral melanoma
Labial lentigo

- Grayish-brown lines
- Curvilinear pattern
- Pigmentation of the basal epidermis and a few melanophages in the lamina propria
- No increase of the number of melanocytes

![Image](image-url)
Seborrheic Keratosis

- Multiple milia-like cysts
- Irregular crypts / comedo-like openings
- Fissures/ridges
- Fingerprint-like structures

Milia-like cysts = pseudo-horn cysts
- (black arrows)
Comedo-like openings = comedo structures
- (red arrows)
- Irregular crypts and comedo like openings

- Fissures and Ridges
  - Wedge shaped clefts in the epidermis
  - AKA gyri and sulci, fat fingers, or cerebriform pattern
  - Can also be seen in melanocytic nevi with congenital patterns, and epidermal nevi

- Fissures/ridges

- Congenital type nevus with fissures/ridges

- Personal Collection, patient granted special permission to show tattoo
Fingerprint – Like Structures

- Tiny ridges running in parallel
- Typically seen in flat seborrheic keratoses or solar lentigo

Multiple milia like cysts
Dermoscopic features
- Light brown color
- Fingerprint like structures

Diagnosis: Solar lentigo

Pigmented BCC
- Absent pigment network and:
  - Ulceration
  - Large blue gray ovoid nests
  - Multiple blue gray globules
  - Arborizing (tree-like) vessels
  - Maple leaf areas
  - Spoke wheel areas

Ulceration
- Seen in pigmented and non-pigmented basal cell carcinoma
Large Blue-Gray Ovoid Nests

- Well circumscribed, confluent, pigmented ovoid areas
- Larger than globules
- Not connected to larger tumor body
- Represent large nests of pigmented BCC

Multiple Blue-Gray Globules

- Round, well circumscribed structures
- Smaller nests of pigmented basal cells
Arborizing vessels

121

123

124

125

126

127
Milia

BCC

Maple Leaf Areas

- Nests of pigmented epithelial nodules of basal cell carcinoma

Spoke-Wheel Areas

- Well circumscribed brown to gray-blue-brown radial projections meeting at a darker central hub
- Nests of basal cell carcinoma radiating from a follicular epithelium
Hemangioma
- Red-blue homogeneous color
- Red-blue lacunae

Angiokeratoma
- Multiple red to bluish-black lacunae
- Blue-white veil: no diagnostic significance
- Red-blue lacunae, no pigment network
- Hyperkeratosis over thrombosed vessels
Acral pseudolymphomatous angiokeratoma of children with rainbow pattern: A mimic of Kaposi sarcoma
Pinós León, Víctor Hugo et al.
Journal of the American Academy of Dermatology, Volume 76, Issue 2, S25 - S27

Dermatofibroma
- Central scar like pallor
- Surrounding delicate pigment network

Cellular Dermatofibroma
To be a Melanoma...
Must satisfy both below

- Absence of both negative features:
  - Single color
  - Symmetry of pattern/texture

- Presence of at least 1 positive feature:
  - Blue white veil
  - Peripheral black dots/globules
  - Multiple brown dots
  - Pseudopods
  - Radial streaming
  - Scar like depigmentation
  - Multiple 5-6 colors
  - Multiple blue grey dots
  - Broadened network

Benign Melanocytic vs Melanoma

- Negative Features
  - Presence of only a single color
  - tan, dark brown, blue, black, red, grey, pink
  - Symmetry of pattern/texture
  - all axes through the centre of a lesion
  - Does NOT require symmetry of shape
Positive Features
- Blue white veil
- Peripheral black dots/globules
- Multiple brown dots
- Pseudopods
- Radial streaming
- Scar like depigmentation
- Multiple 5-6 colors
- Multiple blue grey dots
- Broadened network

Blue White Veil
- Blue white veil
- Compact orthokeratosis
- Aggregation of heavily pigmented cells in the dermis

Dots
- Small round structures < 0.1 mm diameter
- Pigment accumulation
- May be black, brown, gray, or blue gray
- Black = stratum corneum, upper epidermis
- Brown = DEJ
- Gray = papillary dermis
- Multiple blue grey dots – peppering
- Loose melanin in dermis, or melanophages
- Multiple brown dots
- Focal Pagetoid single and nested melanocytes

- Multiple blue grey dots – peppering
- Loose melanin in dermis, or melanophages

Pseudopods / Radial streaming
- Intraepidermal or junctional confluent melanocytic nests
- Connected to pigment network or tumor body
- One of the most specific features of SSMM
Lentigo Maligna features

- Rhomboidal structures
- Asymmetric pigmented follicular openings
- Slate gray globules
- Annular granular structures

Lentigo Maligna

- Atypical pigment pseudo-network
- Rhomboidal structures around hair follicle
- Pigmentation at “shoulders” of the infundibula

Personal Collection
The most likely diagnosis is:
- Asymmetric pigmented follicular openings
- Early rhomboidal structures
- Zigzag structures

Zig-zag structures
- Incompletely formed rhomboidal structures

Actinic keratosis
- Strawberry vascular pattern
- Mixed with slight pigment pseudonetwork

Lentigo maligna
- Strawberry vascular pattern
- Covered by pigmented pseudonetwork
- Homogenous structureless pigmentation
- Grey in the background
Dermoscopic findings
- Asymmetric lesion
- Multiple colors
- Irregular broadened pigment pseudonetwork
- Brown rhomboidal structures
- Red rhomboidal structures

Diagnosis: Lentigo Maligna

Acral Melanoma
- Parallel ridge pattern
  - not respecting normal anatomy => malignant
- Benign parallel patterns
  - Parallel furrow/lattice
  - Fibrillar/filamentous

Parallel-ridge pattern
- Highly specific to acral melanoma
Non-Pigmented Lesion Dermoscopy
Non-Pigmented Lesion Dermoscopy

- Problem: No Pigment!
- Solution: Use your clues!
  - Vascular structures
  - Chrysalis structures
  - Texture
  - Structureless areas
  - Scale

Vascular patterns:
- Depend on the thickness of the tumor
- Early: Irregular dotted vessels
  - Longer, coarser, and more variable in shape
- Advanced: Linear irregular vessels
  - Longer, coarser, and more variable in shape
- Polymorphous vascular pattern
  - Linear irregular vessels with milky red/pink areas

Amelanotic Melanoma vs BCC

A regular
B in a string
C clustered
D radial
E irregularly branched
F irregular
Amelanotic Melanoma – Another Example
- Irregular linear vessels
- Located eccentrically at the edge of the lesion

Chrysalis Structures
- AKA Crystalline structures or shiny white streaks (SWS)
- Only seen with polarized dermoscopy
- Most commonly seen in basal cell carcinoma and invasive melanomas, may be seen in dermatofibromas and scars
  - In melanomas may reflect increased tumor thickness and regression

Amelanotic Melanoma
- Crystalline/chrysalis structures
- Polymorphous vessels
Hypomelanotic Melanoma
- Crystalline/chrysalis structures
- Polymorphous vascular pattern
- Irregular pigment network at periphery

Superficial Spreading Melanoma
- Negative pigment network – white reticular pattern due to elongated rete pegs
- May be seen in melanomas (or Spitz but more regularly)
- Somewhat reminiscent of the pattern seen in lesions of atrophie blanche
- Irregular dotted vessels at the periphery
- Negative pigment network should not be confused with the pale areas between globules of a benign nevus

Benign intradermal nevus with comma vessels
Non pigmented Actinic Keratoses

- Pink-red pseudo-network surrounding follicles
- White-to-yellow surface scale
- Fine wavy vessels surrounding hair follicles
- Yellowish keratotic plugs in follicular ostia
Pigmented actinic keratosis

Squamous Cell Carcinoma in Situ
- Glomeruloid blood vessels
- Focal heme crust
- Scale

Scale
Clear cell acanthoma

- String of pearls vessels
- Glycogen rich keratinocytes
Porokeratosis
- White tract structure = cornoid lamella
- Central white area, red dots, globules and lines

Sebaceous Hyperplasia
- Aggregated white-yellow nodules ~ cumulous cloud
- Crown vessels (radial wreath-like)
  - Bunching vessels that extend towards the center of the lesion without crossing it
Trichoscopy
- Examination of hair follicles with incident light magnification with dermoscopy or videodermoscopy – term introduced in 2006
- Useful for inflammatory, infectious, scarring, and non-scarring alopecia
- Deserves its own lecture
Alopecia areata – exclamation point hairs
Androgenetic alopecia – miniaturized hair follicles
Lichen Planopilaris – perifollicular scale and erythema
Discoid lupus erythematosus – Central hypopigmented atrophic scar and dilated follicular orifices
Hair casts (pseudonits)
Nits
CASE #1

The most likely diagnosis is:

A. Benign lichenoid keratosis
B. Basal cell carcinoma
C. Amelanotic Melanoma
D. Actinic keratosis
E. Atypical nevus
The most likely diagnosis is:
A. Benign lichenoid keratosis
B. Basal cell carcinoma
C. Amelanotic Melanoma
D. Actinic keratosis
E. Atypical nevus

Dermoscopic findings
- Asymmetric lesion
- Multiple colors
- Irregular pigment network at periphery with focal irregular dots
- Linear irregular vessels
- Chrysalis structures

Diagnosis: Superficial Spreading Melanoma

CASE # 2

The most likely diagnosis is:
A. Nodular melanoma
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Angiokeratoma
E. Pigmented basal cell carcinoma
The most likely diagnosis is:

A. Nodular melanoma
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Angiokeratoma
E. Pigmented basal cell carcinoma

Dermoscopic features

- Asymmetric
- Blue grey ovoid nests
- Arborizing telangiectasias
- Chrysalis structures
- Epidermal ulceration

Diagnosis: Pigmented basal cell carcinoma
CASE # 3

The most likely diagnosis is:

A. Stasis dermatitis
B. Actinic keratosis
C. Porokeratosis
D. Clear cell acanthoma
E. Squamous cell carcinoma in situ
Dermoscopic findings
- Glomeruloid blood vessels
- Focal hemic crust
- Scale

Diagnosis: Squamous Cell Carcinoma In Situ

The most likely diagnosis is:
A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Superficial spreading melanoma
D. Atypical nevus
E. Pigmented basal cell carcinoma
The most likely diagnosis is:
A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Superficial spreading melanoma
D. Atypical nevus
E. Pigmented basal cell carcinoma

Dermoscopic findings
- Asymmetric lesion
- Multiple colors
- Irregular pigment network
- Scar-like depigmentation
- Chrysalis structures

Diagnosis: Superficial Spreading Melanoma

CASE #4B
The most likely diagnosis is:

A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Superficial spreading melanoma
D. Atypical nevus
E. Pigmented basal cell carcinoma

Dermoscopic findings
- Asymmetric lesion
- Multiple colors
- Multiple blue-grey globules
- Sharply focused arborized telangiectasias

Diagnosis: Pigmented Basal Cell Carcinoma

CASE # 5
The most likely diagnosis is:

A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Lentigo maligna
D. Atypical nevus
E. Solar lentigo

Dermoscopic findings
- Asymmetric lesion
- Fingerprint-like structures

Diagnosis: Solar lentigo
The most likely diagnosis is:

A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Superficial spreading melanoma
E. Pigmented basal cell carcinoma

Dermoscopic features
- Asymmetric
- Broadened irregular pigment network
- Pseudopods

Diagnosis: Superficial spreading melanoma
CASE # 7

The most likely diagnosis is:

A. Actinic keratosis
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Clear cell acanthoma
E. Basal cell carcinoma

The most likely diagnosis is:

A. Actinic keratosis
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Clear cell acanthoma
E. Basal cell carcinoma
Dermoscopic features

- String of pearls blood vessels

Diagnosis: Clear cell acanthoma

The most likely diagnosis is:

A. Lentigo maligna
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Solar lentigo
E. Pigmented basal cell carcinoma
The most likely diagnosis is:

A. Lentigo maligna
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Solar lentigo
E. Pigmented basal cell carcinoma

Dermoscopic findings

- Asymmetric lesion
- Multiple colors
- Irregular pigment network
- Scar-like depigmentation

Diagnosis: Lentigo maligna

The most likely diagnosis is:

A. Lentigo maligna
B. Inflamed seborrheic keratosis
C. Atypical nevus
D. Solar lentigo
E. Pigmented basal cell carcinoma

The most likely diagnosis is:

A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Superficial spreading melanoma
D. Atypical nevus
E. Pigmented basal cell carcinoma

CASE #9
The most likely diagnosis is:

A. Pigmented actinic keratosis
B. Inflamed seborrheic keratosis
C. Superficial spreading melanoma
D. Atypical nevus
E. Pigmented basal cell carcinoma

Dermoscopic findings:
- Asymmetric lesion
- Scar-like regression
- Irregular broadened pigment network
- Blue white veil
- Multiple blue grey dots

Diagnosis: Superficial spreading melanoma

BONUS CASES
**BONUS CASE 4**

**BONUS CASE 5**

**Dermoscopic features**
- Asymmetric
- White, pink, light brown
- Central scar-like area

Diagnosis: Retained buckshot
Thank you!

Michelle Tarbox, MD
Assistant Professor of Dermatology
Texas Tech University Health Sciences Center
Michelle.Tarbox@ttuhsc.edu