Second Edition

DERMOSCOPY

An Illustrated Self-Assessment Guide

Robert H. Johr
Wilhelm Stolz

Mc Graw Hill Education

Dermoscopy

An Illustrated Self-Assessment Guide

Second Edition

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Foreword

We have learned over the years that a new or changing skin lesion, sometimes having one or more of the so-called "ABCDEs" should prompt a patient to consult his/her primary care physician or dermatologist. More than any single physician, the dermatologist is the center of responsibility in diagnosing and establishing treatment for curable, early-stage melanomas. Thus, it behooves the expert dermatologist to assure him/her that he/she has *all* of the necessary up-to-date diagnostic tools to accurately diagnose malignant melanoma of all types and from all sites.

The best dermatologic diagnosticians need to be completely conversant with the latest knowledge related to clinical, histological, dermoscopic/dermatoscopic, and clinical management of malignant melanoma. Just as the clinical dermatologist needs to understand histopathology, the best dermoscopist needs to be an "expert" clinician and dermatopathologist. Simultaneously, the dermoscopist must be facile in the language of dermoscopy, which is a language full of new words, descriptions, and systems. Further, a unique and comprehensive glossary (included) helps flatten out what would ordinarily be a steep learning curve related to both dermoscopic technique and terminology.

Many melanoma experts throughout the world have recognized the importance of dermoscopy/dermatoscopy in the realm of dermatologic oncology and dermatology. In view of all of this, a state-of-the-art succinct second edition of *Dermoscopy: An Illustrated Self Assessment Guide* by Drs. Robert H. Johr and Wilhelm Stolz is a welcome addition to our library. Described by the authors as "short, sweet, and to the point," this book provides a wonderful and seriously useful opportunity to jump into the "heads" of these outstanding dermoscopists and join them in learning about the 218 patients and their dermoscopic images beautifully depicted, learning this important skill all along the way. The book is organized into learning experiences which mimic real life clinical dermatology. These learning experiences flow one into the other through a perfect melding of the teaching skills of the authors.

Doctors Robert H. Johr and Wilhelm Stolz are particularly well suited to teach dermoscopy. They have extensive experience in clinical dermatology, dermatologic oncology, and melanoma. Further, both are exemplary teachers and are outstanding academicians and Professors at the University of Miami Miller School of Medicine (Dr. Johr) and the University of Munich School of Medicine (Dr. Stolz).

The second edition is new unto itself. It includes numerous new and well-done dermoscopic images, a broad view of the use of dermoscopy in general dermatology, a very well-done look at pediatric dermoscopy, as well as subtypes of melanoma such as desmoplastic melanoma. Other cancers of the skin including Merkel cell and squamous cell carcinoma are also included.

The conciseness and clarity of this wonderful tome is perfect for the busy clinician. The quality of the illustrations is exemplary and it is written in a way that allows for an easy read. This book is superbly done and clearly written by two outstanding academicians who know what teaching is all about. Enjoy the experience!

Robert J. Friedman, MD, MSc (Medicine)
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Preface

Dermoscopy is itself a language full of terms that have specific meanings and even connotations, depending on any given lesion being examined. As in any language, its vocabulary is a work in progress based in consensus among its "expert" speakers who are striving to create a system to communicate dermoscopic findings based on observational data. In order for there to be mutual comprehension among users of this powerful technique, the language of dermoscopy must be spoken properly. This is not an easy task because there is a significant learning curve to master the technique as well as its terminology. It takes study, practice, and dedication.

Dermoscopy is the standard of care in many countries around the world and is becoming very popular in the United States. Dermatologists and other groups of physicians are realizing what a valuable tool it is. The goal of this book is to teach what we believe are the important general principles and specific points of dermoscopy and to allow for users to "self-assess" their knowledge and skills using the techniques taught here.

In an era of information overload, we designed the book to be short, sweet, and to the point. We want it to be an easy, enjoyable, and practical read. Important principles are often repeated which is a good way for them to be remembered.

We "keep it real" with 218 cases that any busy clinician may have the opportunity to see in general dermatology clinic on a daily basis. Great clinical and dermoscopic images with short histories are followed by five "true or false" statements. As in real life, then comes the decision making in check box form: what is the potential risk and what is the diagnosis? Finally, the disposition of the case; whether to effect no intervention, follow-up, or to make a histopathologic diagnosis? The concept of dermoscopic differential diagnosis is found throughout the book. In most cases, we do not get into the controversial issue of the best technique to make a histopathologic diagnosis. We leave that up to you.

Turn the page, and the answers to the statements are given in a format that separates our book from the others. The dermoscopic images are presented again with an extensive description of the criteria in the lesion. It is essential to evaluate as much as possible before making a diagnosis. There are many circles, boxes, arrows, and stars to point out the important features of each case. Our goal is to fully demonstrate the global features and local criteria of each lesion. This is another very important unique teaching point of our book.

Each case has a discussion of all of its salient features. Not in long drawn out paragraphs, but in outline form. We realize that your time is valuable and want to make the learning and recall process as easy as possible.

Series of cases are organized into groups. For example, there are lesions in which the major feature might be pigment network, dots and globules, regression, pink, blue or black color, or vascular structures. There are similar-looking clinical and/or dermoscopic images grouped together in specific body locations, such as brownish spots on an ear lobe or in the genital area. This simulates real-life encounters. One case often flows into the next and knowledge gained from the previous case is needed to solve the next case. Melanocytic, non-melanocytic, benign, malignant, or inflammatory pathology from head to toe with 80 melanomas and their most important simulators.

Each case ends with a series of dermoscopic and/or clinical pearls based on years of experience treating patients with atypically pigmented skin lesions and skin cancer. The patients' well-being trumps political correctness. The book is sprinkled with general principles and specific points that are controversial but strongly embedded in our core beliefs.

New features in the second edition include 69 new cases in chapters two through five, a chapter on trichoscopy and dermoscopy in general dermatology. There is a glossary with defintions of important specific points and general principles one might want to review at a glance. The latest information on fungal melanychia, pediatric melanoma, desmoplastic melanoma, nevi, and melanoma associated with decorative tatoos, Merkel cell carcinoma and invasive squamous cell carcinoma are also presented.

Being a cutting edge diagnostician must include the tissue-sparing and potentially life-saving technique called dermoscopy. Each of us has a profound responsibility for the well-being of every patient that walks through the door. Always regard each patient as someone's precious loved one as if they were your own!

Robert H. Johr
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Acknowledgments

I want to dedicate this book to those people who have decided to use it as a tool to improve their diagnostic skills. I say to you "Always try to be as good as you can be."

For Professor Wilhelm Stolz, a pioneer in the field of dermoscopy and a loyal friend and colleague of more than twenty years. The second edition would not have been possible without his contribution of great cases.

I owe infinite gratitude to my wife Irma. My life's best friend. For your continuous sage advice, encouragement, and support. "Te amo."

Dr. Robert H. Johr

First and foremost, I would like to express my deepest gratitude to my wife, Karola, who has lovingly shared my many dermoscopic and academic pursuits over the last three decades. For her enthusiasm and skill with the beautiful color photography, a cornerstone of our text, I thank Mrs. Ulrike Brückl. Special thanks to our nurses, Mss. Carolin Mertens and Antje Angilotti, whose consistent passion and professionalism contributed greatly to our text. To the many physicians who supported me in my dermoscopy clinic and in the case preparations, most especially Drs. Brigitte Coras, Stefanie Guther, Anette Michael, Katrin Ramrath, Alexandra Tillmann, and Ulrike Weigert, I wish to extend my sincerest thanks. Finally, special thanks go to Mrs. Agnes Kaldewei, my long-time clinical and scientific assistant. Without her continuous and ever pleasant support, this text would not have been possible.

Dr. Wilhelm Stolz

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Chapter 1

Dermoscopy from A to Z

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SYNONYMS

- Dermatoscopy
- Skin surface microscopy
- Epiluminescence microscopy (ELM)
- Digital dermoscopy/digital ELM
- Auflichtmikroscopie (German)
- Dermoscopia/dermatoscopia (Spanish)
- Dermoscopy and dermatoscopy are used interchangeably by experienced dermoscopists and in the literature

DEFINITION

- Dermoscopy is an in vivo, noninvasive technique in which oil or fluid (eg, mineral oil, gels, alcohol, and water) is placed on the lesion
  - Fluid eliminates reflection of light from the surface of the skin allowing visualization of color and structure in the epidermis, dermoepidermal junction, and papillary dermis
  - The color and structure visualized cannot be seen with the naked eye or with typical magnification that clinicians use
  - Polarizing light and digital instrumentation do not require fluid
- When using polarized light dermoscopy
  - Light from a polarized light source penetrates the stratum corneum with less scatter
  - A second polarizer screens out scattered surface light resulting in the physician seeing primarily light from the deeper structures
  - This removes the need for contact with the skin and the need for immersion fluids, resulting in faster examination times
- There is noncontact and contact polarized dermoscopy
  - Gels can be used with contact polarized dermoscopy to enhance the appearance of vessels or eliminate the negative effects of dry skin
- There is contact nonpolarized dermoscopy
  - Some criteria can be better visualized with polarized dermoscopy such as small vessels and blue-white color.
  - Some criteria can be better visualized with nonpolarized contact dermoscopy such as milia-like cysts seen in seborrheic keratosis and melanocytic lesions
  - Crystalline structures (a.k.a. shiny white structures) can only be seen with polarized dermoscopy
  - All the criteria needed to make a dermoscopic diagnosis can be made using any form of the technique

BENEFITS OF DERMOSCOPY

- Helps to differentiate melanocytic from nonmelanocytic skin lesions
- Helps to differentiate benign from malignant skin lesions
- With dermoscopy, the sensitivity to diagnose melanoma is 85% and better compared to 65 to 80% when the technique is not used
- Increases the diagnosis of early melanoma
- Increases the diagnosis of amelanotic and hypomelanotic melanoma
- Increases the diagnosis of melanoma incognito (false negative melanoma)
- Increases the diagnosis of inflammatory lesions (ie, lichen planus, psoriasis, seborrheic dermatitis)
- Increases the diagnosis of infestations (ie, scabies, head and crab lice)
- Increases the diagnosis of hair shaft pathology (ie, monilethrix, trichorrhexis invaginata)
- Helps to avoid unnecessary surgery
- Helps to plan surgery
- Helps to work better with a pathologist (asymmetrical high-risk criteria, dermoscopic–pathologic correlation)
- Patient reassurance
- Allows for follow-up of patients with a single nevus or multiple nevi digitally to find changes over time

Dermoscopic Digital Monitoring

- There are pigmented skin lesions that are not high risk enough to warrant immediate histopathologic diagnosis, yet not so banal that there is no concern at all
- There are melanomas that do not appear to be high risk clinically or with dermoscopy
- They are only diagnosed after monitoring for dermoscopic changes over time when comparing baseline with subsequent digital images
- Short-term monitoring is performed every 3 or 4 months
  - Any change over time could be a melanoma
- Long-term monitoring is done at 6-month to yearly intervals
  - Important changes include asymmetrical enlargement, the appearance of high-risk criteria, new colors, or regression
- Single or multiple suspicious pigmented skin lesions can be chosen for digital monitoring

THE 2-STEP ALGORITHM

- The analysis of a suspicious skin lesion is a 2-step process
  - Step one: determine if it is melanocytic or nonmelanocytic
  - Step two: if it has the criteria for a melanocytic lesion, the second step is to determine if it is low, intermediate, or high risk using the melanocytic algorithm of your choice
- Pattern analysis was the first melanocytic algorithm developed for this purpose and is most often used by experienced dermoscopists. Variations of pattern analysis have also been developed, including
  - The ABCD rule of dermatoscopy (Table 1-1)
  - The 11-point checklist (Table 1-2)
  - The 7-point checklist (Table 1-3)
  - The 3-point checklist (Table 1-4)

Table 1-1 ABCD RULE OF DERMATOSCOPY: IDENTIFY CRITERIA AND ASSIGN POINTS TO DETERMINE TOTAL DERMATOSCOPY SCORE (TDS)

DERMOSCOPIC CRITERION	DEFINITION	SCORE WEIGHT FACTOR
*A*symmetry	In 0, 1, or 2 perpendicular axes; assess contour, colors, and structures	0–2
*B*order	Abrupt ending of pigment pattern at periphery in segments	0–8
*C*olor	Presence of up to 6 colors (white, red, light brown, dark brown, blue-gray, and black)	1–6
*D*ermoscopic structures	Presence of network, structureless (homogeneous) areas, branched streaks, dots, and globules	1–5

Formula for calculating TDS: (A score × 1.3) + (B score × 0.1) + (C score × 0.5) + (D score × 0.5) = TDS. Interpretation of total score: <4.75. Benign melanocytic lesion 4.75–5.45; suspect lesion (close follow-up or excision recommended); >5.45, lesion highly suspect for melanoma

Step One: Identification of Criteria

Look for the criteria associated with a melanocytic lesion. If one does not find them, the search is on for the criteria associated with seborrheic keratosis, basal cell carcinoma, dermatofibromas, vascular lesions, and others (Table 1-5)

- Not all of the possible criteria are needed to make a diagnosis
- When there is absence of criteria for a melanocytic lesion, seborrheic keratosis, basal cell carcinoma, dermatofibroma, or vascular lesion, you are now dealing with a melanocytic lesion by default
- The "default category" is the last criterion used to diagnose a melanocytic lesion (Fig. 1-1)

Table 1-2 11-POINT CHECKLIST

DERMOSCOPIC CRITERIA
1. Symmetry of pattern (negative feature)
2. Presence of single color (negative feature)
POSITIVE FEATURES
3. Blue-white veil (color)
4. Multiple brown dots
5. Pseudopods (streaks)
6. Radial streaming (streaks)
7. Scar-like depigmentation
8. Peripheral black dots/globules
9. Multiple (5 or 6) colors
10. Multiple blue/gray dots
11. Broadened network (irregular pigment network)

For melanoma to be diagnosed, both negative features must be absent and 1 or more of the 9 positive features must be present.

Table 1-3 7-POINT CHECKLIST

DERMOSCOPIC CRITERIA	SCORES
1. Irregular pigment network (**major criteria**)	2
2. Bluish-white veil (any blue and/or white color)	2
3. Polymorphous vascular pattern	2
4. Irregular streaks (**minor criteria**)	1
5. Irregular dots/globules	1
6. Irregular blotches	1
7. Regression	1

By simple addition of the individual scores a minimum total score of 3 is required for the diagnosis of melanoma, whereas a total score of less than 3 is indicated of nonmelanoma.

Criteria Defined

Melanocytic lesion

PIGMENT NETWORK/NETWORK/RETICULATION

- On the trunk and extremities
- Shades of black or brown
- Honeycomb-like, reticular, web-like line segments (elongated and hyperpigmented rete ridges) with hypopigmented holes (dermal papilla)

WHITE/NEGATIVE NETWORK

- Bony-white network-like structures
- Not a primary criterion used to diagnose melanocytic lesions
- Can be seen in pink/pigmented nevi, Spitz nevi, melanoma, and dermatofibromas

PSEUDONETWORK/PSEUDOPIGMENT NETWORK

- Because the skin of the head and neck is thin and does not have well-developed rete ridges, one sees
  - Appendageal openings/adnexal structures (sebaceous glands, hair follicles)
  - Uniform, round white or yellowish structures
- When they penetrate areas of diffuse pigmentation, reticular-like structures are formed that is referred to as the pseudonetwork
- Gray pseudonetwork associated with benign (ie, lichen planus–like keratosis) and malignant pathology (ie, melanoma) can be seen on the face, nose, and ears
- Monomorphous appendageal openings can often be seen on the skin of the face without any pigmentation

Table 1-4 3-POINT CHECKLIST TO DIAGNOSE HIGH-RISK LESIONS (MELANOMA, BASAL CELLS)

Asymmetry of color and/or structure
Irregular pigment network
Blue and/or white color
2 out 3, 3 out 3 → Excise

The 3-point checklist is based on simplified pattern analysis and is intended to be used by nonexpert dermoscopists as a screening technique. Its aim is to diagnose melanocytic and nonmelanocytic potentially malignant pathology.

Table 1-5 CRITERIA FOR VARIOUS LESIONS

CRITERIA FOR A MELANOCYTIC LESION

Pigment network (trunk and extremities)
Aggregated brown globules
Homogeneous blue color (blue nevus)
Parallel patterns on acral sites
By default (when there is an absence of criteria for a melanocytic lesion, seborrheic keratosis, basal cell carcinoma, hemangioma, or dermatofibroma, the lesion should be considered melanocytic by default)

CRITERIA FOR A SEBORRHEIC KERATOSIS

Milia-like cysts
Pseudofollicular/comedo-like openings
Fissures/furrows and ridges/fat fingers
Hairpin vessels
Sharp demarcation

CRITERIA FOR A BASAL CELL CARCINOMA

Absence of of pigment network
Arborizing blood vessels
Pigmentation
Ulceration
Spoke-wheel structures

CRITERIA FOR A DERMATOFIBROMA

Central white patch
Peripheral pigment network

CRITERION FOR A VASCULAR LESION

Vascular spaces called lacunae

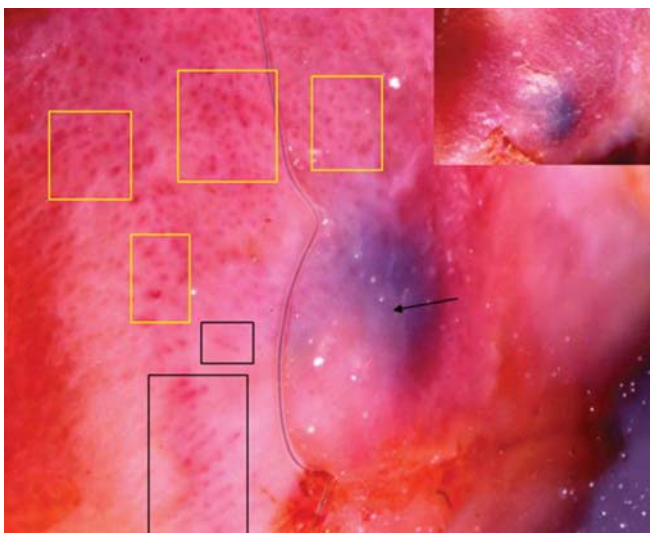

FIGURE 1-1 Amelanotic melanoma. This is a melanocytic lesion by default because there is an absence of criteria for a melanocytic lesion, seborrheic keratosis, basal cell carcinoma, dermatofibroma, or hemangioma. The blue-white color (arrow) is a clue that this might be a melanocytic lesion. There are pinpoint/dotted (yellow boxes) and irregular linear (black boxes) vessels plus a general milky-red background color. Note: This interdigital melanoma was mistakingly treated as a tinea for 2 years. *(Reproduced, with permission, from Journal of Drugs in Dermatology. New Methods and Technologies. May 2008-Vol 7-Issue 5. Fig 1b.)*

- They should not be confused with the milia-like cysts seen in seborrheic keratosis
- It is not always possible to make the differentiation
- Consequences could be misdiagnosing lentigo maligna for a seborrheic keratosis
- This criterion can be seen with nonmelanocytic lesions (ie, solar lentigo, lichen planus–like keratosis)
- It is not diagnostic of a melanocytic lesion

Dots and Globules

- Roundish structures distinguished only by their relative sizes
- Dots (0.1 mm) are smaller than globules (>0.1 mm)
- Black, brown, gray, or red
  - When black, they can represent atypical melanocytes in the epidermis or transepidermal elimination of pigment
  - Regular brown dots and globules (brown is the main color to diagnose a melancytic lesion) represent nests of melanocytes at the dermoepidermal junction
  - Irregular brown dots and globules represent nests of atypical melanocytes at the dermoepidermal junction
  - Grayish dots ("peppering") represent free melanin and/or melanophages in the papillary dermis, which can be seen in regression, alone, or in benign pathology such as lichen planus–like keratosis or posttraumatic
  - Reddish globules (milky-red globules) can be seen in melanoma (neovascularization)
  - It is written and taught that aggregated brown globules identify a melanocytic lesion with no mention of the smaller dots. The reality is that both dots and globules define a melanocytic lesion (Fig. 1-2)

Homogeneous blue pigmentation

- Structureless blue color in the absence of local criteria such as pigment network, dots or globules (Fig. 1-3)

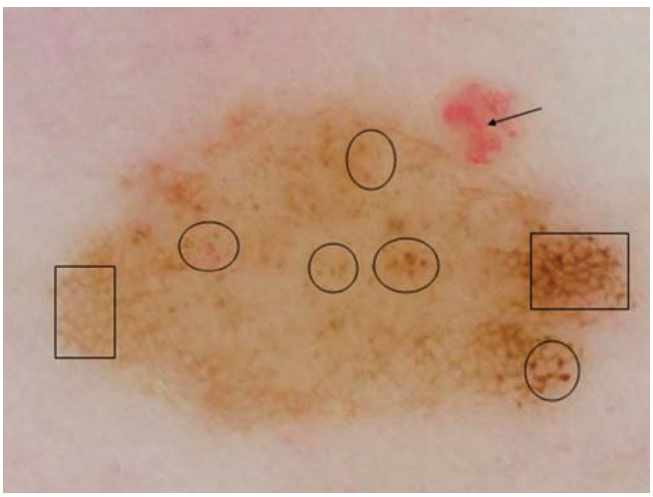

FIGURE 1-2 Acquired nevus. This is a melanocytic lesion because it has pigment network (black boxes) and aggregated brown globules (circles). There is a small hemangioma adjacent to the nevus (arrow).

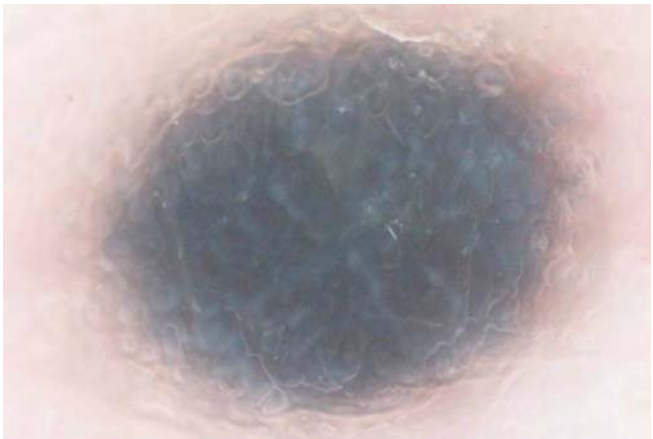

FIGURE 1-3 **Blue nevus.** The classic homogenous blue color of a blue nevus.

- Different shades of homogeneous blue color usually represents a blue nevus
- The history is important because there is a differential diagnosis which could include
  - A lesion as banal as a radiation tattoo to one more ominous such as nodular or cutaneous metastatic melanoma

Parallel patterns/acral patterns/palms and soles

- Fissures/furrows and ridges on the skin of the palms and soles (dermoglyphics)
- Can create parallel patterns
  - Parallel lines can also be seen on all nonglabrous skin/mucosal surfaces (ie, lips, genitalia)

Parallel furrow pattern (benign pattern)

- Thin brown parallel lines in the furrows of the skin (crista superficialis limitans)
- Variations include 2 thin lines with or without dots and globules (Fig. 1-4)

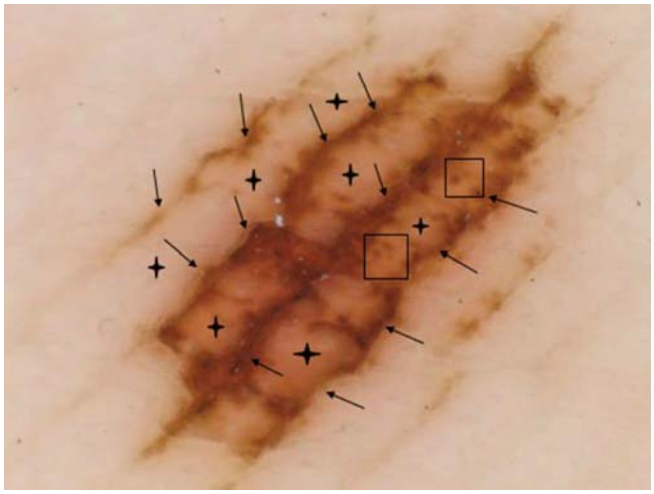

FIGURE 1-4 **Acral nevus.** This is a melanocytic lesion on acral skin with the benign parallel furrow pattern. Pigmentation is in the thin furrows (arrows) with globules (boxes) in the ridges (stars).

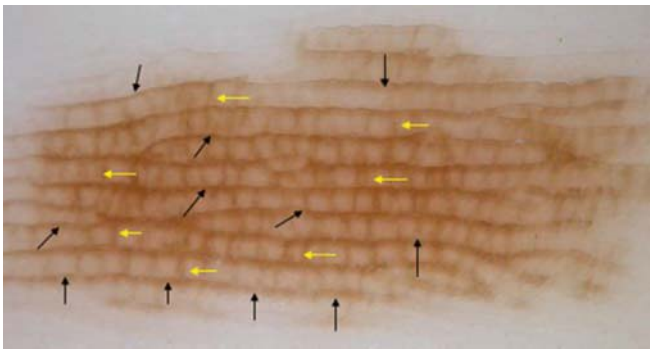

FIGURE 1-5 **Acral nevus.** Brown lines in the furrows (black arrows) and perpendicular to the furrows (yellow arrows) characterize the lattice-like pattern. Pressure on the foot can change this into the fibrillar pattern with fine oblique (/////) lines.

Lattice-like pattern (benign pattern)

- Thin brown parallel lines in the furrows
- Thin brown parallel lines running perpendicular to the furrows forming a ladder-like picture (Fig. 1-5)

Fibrillar pattern (benign pattern)

- Fine brown lines
- Run in an oblique (/////) direction
- Pressure can change the lattice-like pattern into a fibrillar pattern

Globular pattern (benign)

- Brown globules without a parallel component

Reticular pattern (benign)

- A lesion with only pigment network

Homogeneous pattern (benign)

- Brown homogeneous color

Parallel ridge pattern (thin/early melanoma)

- Pigmentation is in the thicker ridges of the skin (crista profunda intermedia) (Fig. 1-6)
- Sometimes there are monomorphous round white structures in the ridges that represent the acrosyringia of the sweat ducts "string of pearls"
- The acrosyringia are always in the ridges
- An important landmark when one has to determine if pigmentation is in the furrows or ridges. Benign (furrows) vs malignant (ridges) pathology
- Foci of the parallel ridge pattern can be seen in more advanced acral melanomas with a multicomponent global pattern and melanoma-specific criteria (ie, regression, irregular blotches, blue color, polymorphous vessels)
- Parallel ridge pattern created by blood (talon noir, black heel) (Fig. 1-7)
- Parallel ridge pattern in darker skinned races (Fig. 1-8)
- Macules seen in the Peutz-Jeghers syndrome
- This pattern is not 100% diagnostic of melanoma

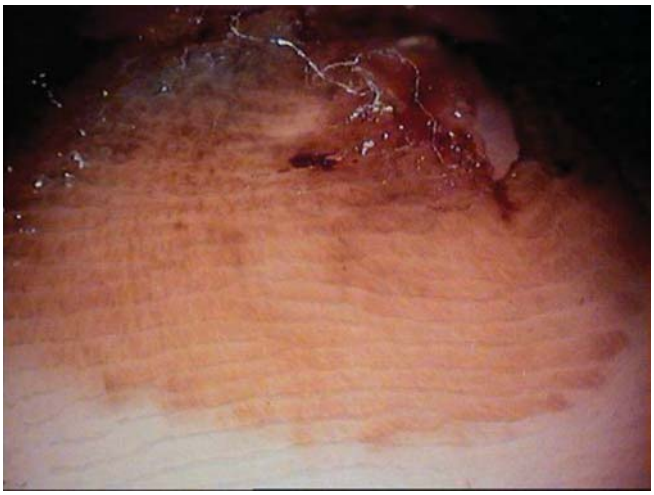

FIGURE 1-6 Acral melanoma. The parallel ridge pattern diagnoses this acral melanoma with pigmentation in the thicker light brown ridges. The thin white lines are the furrows.

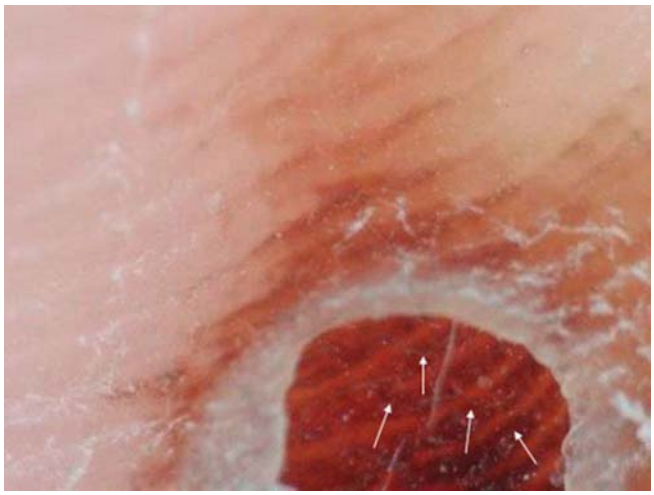

FIGURE 1-7 Acral hemorrhage. The parallel ridge pattern created by blood (white arrows).

Diffuse variegate pattern (melanoma)

- Irregular pigmented dark blotches
- Black, brown, or gray

Multicomponent pattern (melanoma)

- Filled with regular and irregular criteria
- Multiple colors plus areas with acral benign patterns (fibrillar, parallel furrow)

Nonspecific pattern (melanoma)

- If one cannot determine any of the above benign or malignant patterns, this represents a "red flag" of concern

PEARLS

- There can be exceptions to every dermoscopic rule
- The history and clinical appearance of a lesion are important and should not be ignored
- Negative "gut" feelings should not be ignored
- If an acral lesion is rapidly changing yet has a benign appearance, it still could be melanoma
- A supposedly benign acral pattern with irregularity of some components could be high risk
- The presence of blood at acral sites (palms, soles, nails) can be associated with melanoma
- Look carefully for other high-risk criteria when blood is seen
- If in doubt, cut it out!

Seborrheic keratosis

Milia-like cysts

- Variously sized white or yellow structures
- Small or large, single or multiple
- They can appear opaque or bright-like "stars in the sky" (epidermal horn cysts)

Pseudofollicular openings/comedo-like openings

- Sharply demarcated roundish structures
- Pigmented or nonpigmented
- Shapes can vary, not only within a single lesion, but from lesion to lesion in an individual patient
- When pigmented, they can be brownish yellow or even dark brown and black (oxidized keratin-filled invaginations of the epidermis)
- Pigmented pseudofollicular openings can be hard to differentiate from the pigmented dots and globules of a melanocytic lesion (Fig. 1-9)

Fissures/Furrows and ridges

- Fissures/furrows (sulci) and ridges (gyri) seen in seborrheic keratosis can create several patterns

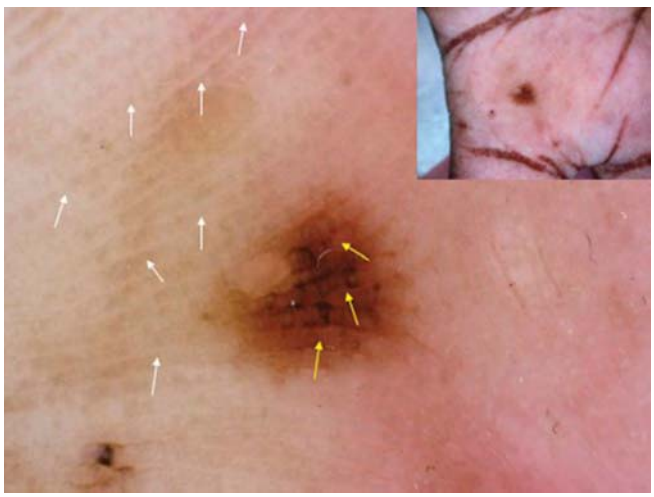

FIGURE 1-8 Acquired nevus. There is an increased incidence of acral melanoma in darker skinned races. This nevus on the palm of an African-American was without change and demonstrates the benign parallel ridge pattern. Pigmentation is seen in the ridges of the nevus (yellow arrows) and in the ridges of the entire palm (white arrows).

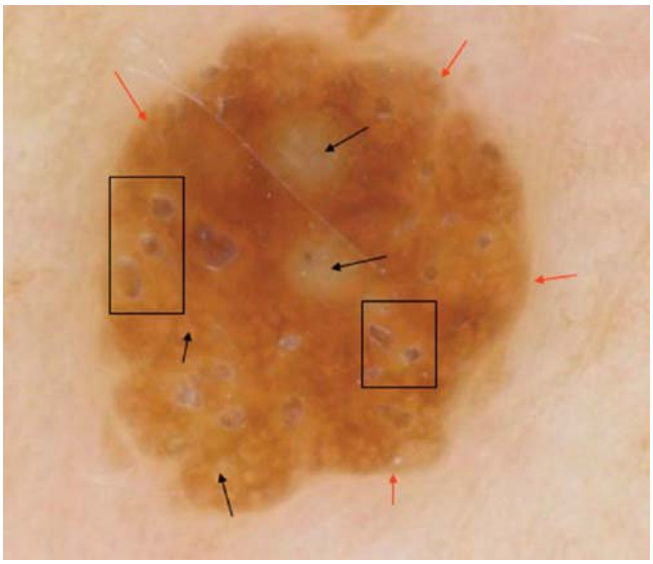

FIGURE 1-9 Seborrheic keratosis. Sharp borders (red arrows) milia-like cysts (black arrows) and pseudofollicular openings (boxes) characterize this seborrheic keratosis.

- Large irregularly shaped keratin-filled fissures are called crypts
  - Fissures/furrows and ridges can also be seen in papillomatous melanocytic lesions
  - Cerebriform or brain-like in which they resemble a sagittal section through the cerebral cortex
  - Mountain-like with variously sized or uniformly roundish structures representing mountains (ridges) and fine pigmented lines representing valleys (fissures)
    - Possible to confuse the mountain and valley pattern with the globular or cobblestone pattern of a melanocytic lesion
  - Pigmented lines should not be confused with an irregular pigment network
  - Hypo- and hyperpigmented ridges can be digit-like (straight, kinked, circular, or branched) and are referred to as "fat fingers"
  - "Fat fingers" might be the only clue that a lesion could be a seborrheic keratosis
- All these patterns are commonly seen in this ubiquitous most commonly encountered benign skin lesion (Fig. 1-10)

Fingerprint pattern

- Brown fine/thin parallel line segments that resemble fingerprints
  - The lines can be arched, swirled, or look like branched fungal hyphae
  - The lines can fill the lesion or be broken up
- Differ from the pigment network where the line segments are honeycomb-like or reticular
  - Network-like structures/pseudonetwork can be seen in seborrheic keratosis created by fissures/furrows and ridges not elongated and hyperpigmented rete ridges of the true pigment network

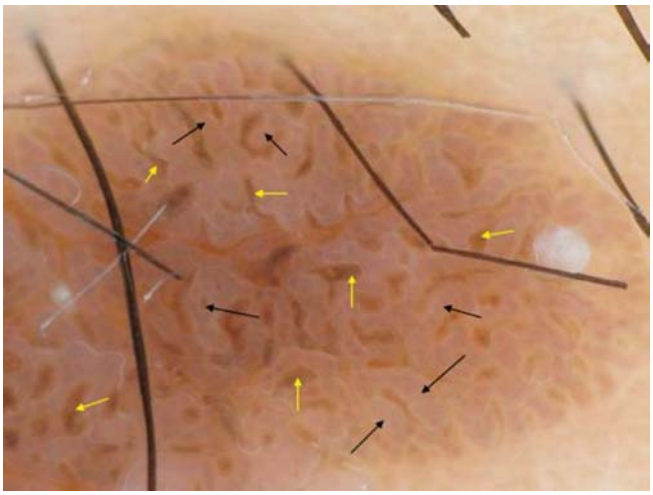

FIGURE 1-10 Seborrheic keratosis. A striking brain-like pattern created by pigmented fissures (yellow arrows) and light ridges (black arrows). Many of the ridges look like "fat fingers."

- Fingerprint pattern can be seen in flat seborrheic keratosis or in solar lentigines
- Some authors believe that solar lentigines are flat seborrheic keratosis (see below and Fig. 1-23)

Hairpin vessels

- Elongated vessels (capillary loops) resembling hairpins (Fig. 1-11)
- May or may not be surrounded by hypopigmented halos
- Light halo indicates a keratinizing tumor and may be found in keratoacanthomas
- Irregular and thick hairpin vessels can be seen in melanoma

Moth-eaten borders

- Flat or slightly raised brown seborrheic keratoses and solar lentigines
- Well-demarcated, concave borders that are felt to resemble a "moth-eaten" garment

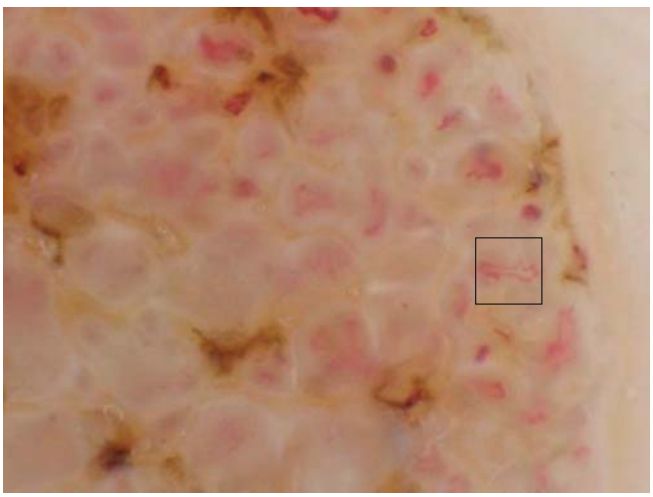

FIGURE 1-11 Seborrheic keratosis. An especially well-formed hairpin vessel in a seborrheic keratosis (black box).

Sharp demarcation

- The majority of seborrheic keratoses have sharp, well-demarcated borders
- Not always indicative of melanoma in a pigmented lesion (see Fig. 1-9)

Basal cell carcinoma

Absence of a pigment network

Arborizing vessels

- One of the most sensitive and specific vascular structures seen with dermoscopy
- Not all basal cell carcinomas contain arborizing vessels
  - Red tree-like branching telangiectatic blood vessels
  - Can be thick or thin lines that are in focus because of their superficial location
- Out-of-focus arborizing vessels are a clue that the lesion might be a melanoma
  - Most often, there are different caliber vessels in a single lesion
- Can also be found in
  - Benign nevi
  - Sebaceous gland hyperplasia
  - Scars
  - On sun-damaged skin
  - Melanoma
  - Desmoplastic melanoma
  - Merkel cell carcinoma
  - Cutaneous metastasis from internal malignancy

Pigmentation

- Basal cell carcinoma may or may not contain pigment (pigmented nests or island of basal cell carcinoma in the dermis) that can range from
  - Fine dots to large leaf-like structures (bulbous extensions forming a leaf-like pattern)
  - Blue-gray ovoid nets
  - Multiple blue-gray dots and globules
  - Colors that can be seen
    - Black
    - Brown
    - Gray
    - Blue
    - Red
    - White
- Not necessary to try to determine if "leaf-like" structures ("maple leaf–like areas") are present because in reality this is a difficult task (Fig. 1-12)

Ulceration

- Single or multiple areas where there is loss of epidermis with oozing blood or congealed blood and crusts (Fig. 1-13)
- Mutifocal ulceration is associated with superficial basal cell carcinomas
- There should be no recent history of trauma

Spoke-wheel structures

- Can be found in up to 10% of basal cell carcinomas

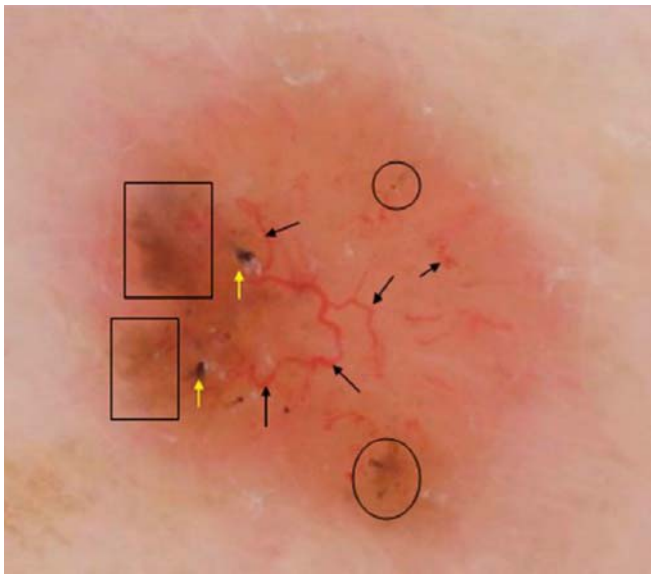

FIGURE 1-12 Basal cell carcinoma. This pigmented basal cell carcinoma has classic arborizing vessels (black arrows), gray blotches (boxes), blue globules (yellow arrows), and fine gray dots (circles). The 3 different presentations of pigmentation point out how variable this criterion can be. *(Reproduced, with permission, from Journal of Drugs in Dermatology. New Methods and Technologies. Sep 2007-Vol 6-Issue 9. Fig 2b.)*

- Diagnostic of basal cell carcinoma
  - May or may not be associated with the other criteria used to make the diagnosis
- Well-defined pigmented radial projections meeting at a darker central globule/central axle/hub
- Complete or incomplete variations of this structure can be seen and one often has to use their imagination to make the identification
- Streak-like structures referred to as pseudostreaks represent incomplete spoke-wheel structures and could be confused with true steaks of a melanocytic lesion
- Finding spoke-wheel structures might be the only clue to the correct diagnosis

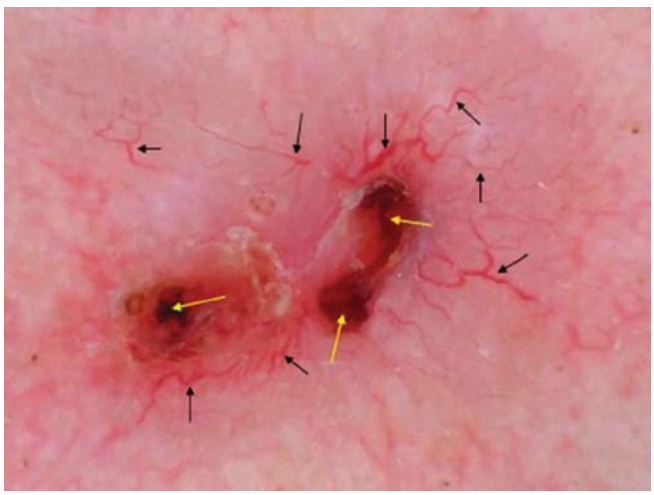

FIGURE 1-13 Basal cell carcinoma. Arborizing vessels (black arrows) and ulceration (yellow arrows) characterize this nonpigmented basal cell carcinoma.