

Dermoscopy

in General Dermatology

EDITED BY

Aimilios Lallas
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Dermoscopy in General Dermatology

*To Zoe, my closest partner in life and work. To Iris and Geppi who taught me the first steps.
To the many friends of the “dermoscopy family” that we keep walking together.*

Aimilios Lallas

To my wonderful wife, Sabrina, for her constant love, support, and patience, which continuously push me to do better in my life and job, and my wise mentor, Prof. Pasquale Patrone, who first believed in me, giving me the opportunity and the freedom to express myself as best as possible in my profession.

Enzo Errichetti

To the 2 most important women of my life: my mother, Stella, and my life partner, Angeliki.

Dimitrios Ioannides

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Preface

No one today challenges the notion that dermoscopy is necessary in diagnosing skin tumors. The naked-eye examination reveals the shape, size, and color of the tumor, but the “micro”—the brushstrokes used to create the details in the patterns and color variations—can only be seen by dermoscopy. Dermoscopy has gained so much appreciation for recognizing skin tumors that, today, performing skin cancer screening without dermoscopy would sound at least incomplete.

Applying dermoscopy for the evaluation of conditions other than skin tumors was a natural evolution. It was nothing more than a result of inductive reasoning that dermoscopy can improve our clinical assessment for any kind of skin eruption or disease. However, the initial efforts to explore the submicroscopic world of inflammatory, infiltrative, and infectious skin diseases were heavily questioned as dubious and, probably, unnecessary.

Less than a decade afterward, the response has been given by real life, as usually happens. The dermoscopic patterns of numerous dermatologic diseases have been investigated, published, and disseminated. More and more dermatologists adopt the idea of using their dermatoscope in a way similar to the stethoscope of general practitioners: as a basic clinical tool, as a piece in the procedure of clinical diagnosis.

This book aims to be useful for those who feel the need to improve themselves as clinicians and acquire additional knowledge on the submicroscopic morphology of skin diseases. It contains the results of years of effort and the induction of various ideas, which led to both satisfactions and disappointments. And, certainly, this book wouldn't be possible without the “participation” of many patients who volunteered to “offer” their problem to make us better. We feel grateful to them, to the “family” of “dermoscopists” around the globe who embraced the effort from the very beginning, to all the researchers whose work is cited in this book, and mainly, to all our colleagues who spend valuable time of their life, trying to improve themselves and help their patients. We are indebted to all our friends and colleagues, who contributed in the book as authors of some chapters.

Finally, here it is—*Dermoscopy in General Dermatology*! We hope that you will enjoy reading it.

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Introduction

Aimilios Lallas and Enzo Errichetti

General overview

Dermoscopy (or dermatoscopy) is a noninvasive, rapid, and efficient diagnostic method that has been established as an irreplaceable part of the clinical examination for the evaluation of pigmented and nonpigmented skin tumors.¹ Existing evidence strongly supports that dermoscopy significantly improves the diagnostic accuracy of clinicians to recognize benign and malignant skin tumors.² In several countries, using dermoscopy is considered a prerequisite not only for dermatologists but also for all clinicians involved in skin cancer screening.

With time passing and experience gained from clinical practice and research, dermoscopy is continuously gaining appreciation also in the field of nonneoplastic dermatoses, including inflammatory, autoimmune, infectious skin diseases, alopecias, and nail abnormalities, as well as for the evaluation of the outcome of therapeutic or cosmetic procedures.³ In fact, it sounds absolutely reasonable that, since dermoscopy reveals morphologic criteria invisible to the unaided eye, it could theoretically be useful in any kind of skin eruption.

During the last decade, several clinicians and researchers started to use dermoscopy in inflammatory and infectious diseases and publishing their findings in the literature, and this way, the exploration of the unknown submacroscopic morphologic world of dermatologic diseases began.^{4,5} However, the majority of described criteria were based on single case reports or case series. Therefore, although brand-new and, thus, fascinating fields, “inflammocopy,” “parasitocopy,” “trichoscopy,” and nail fold dermoscopy are still seen with reservation from some colleagues concerning their reliability in clinical practice. Indeed, up

to a few years ago, no high-level research had been conducted on dermoscopy in other fields than skin tumors. However, during the last years, appropriately designed studies started to be conducted and published, demonstrating something reasonably expected: Reliable criteria do exist, but they need to be efficiently investigated and validated, as happened with the dermoscopic criteria of skin tumors during the previous decades.^{4,6,7}

Basic rules

At the beginning of this book, we would like to underline two fundamental rules about dermoscopy. The first rule applies equally in all indications of dermoscopy, including skin tumors, inflammatory diseases, alopecias, or whichever else skin abnormality. The second rule is also valid for all indications but is particularly relevant in general dermatology (non-neoplastic diseases).

Rule 1. Dermoscopy, by itself, does not make any sense in clinical practice. Although in educational courses or via e-mails or various smart phone apps, users are often confronted with dermoscopic images alone, in the real clinical setting, dermoscopy always follows the clinical, macroscopic inspection. The art of diagnosis in dermatology is a multifactorial complicated process that gathers and combines several information from different sources: macroscopic morphology, symptomatology, history of the lesion(s), history of the patient, palpation, diascopy, scratching, looking through magnifying lenses, and looking through the dermatoscope. In the puzzle of clinical diagnosis, every piece is precious, and so is dermoscopy; not more, but also not less, important than any other piece.

Rule 2. In general dermatology, the diagnosis is usually already established by macroscopic inspection. Even in cases that a straightforward diagnosis is not feasible, still a differential diagnosis is constructed on the basis of the clinical morphology and distribution of the eruption. Any auxiliary tool, like dermoscopy or even histopathology, should be always interpreted within this specific differential diagnosis that has been clinically established. Therefore, applying dermoscopy in general dermatology should be considered as the second step of a two-step procedure, always preceded by the establishment of a differential diagnosis on the basis of the macroscopic morphology. In other words, when looking with the dermatoscope, one should begin from the clinical differential diagnosis and try to narrow it further to one, if possible, entity. Dermoscopic criteria that are generally considered unspecific because they can be found in more than one disease might become very useful within a specific differential diagnosis. For example, linear vessels can be seen in many tumors, inflammatory and infectious diseases, and even on normal skin. So, they cannot be considered as a specific criterion for one entity. However, when the differential diagnosis stands between dermatitis and mycosis fungoides, linear vessels become highly specific, since they typify only one of the possible entities (mycosis fungoides).

Selection of the optimal equipment

In dermoscopy of skin tumors, the main dermoscopic structures result from deposition of pigment at several levels of the skin. Vascular structures and other features are also seen, but they are usually considered less important as compared to pigmented criteria. In contrast, in inflammatory and infectious entities, the main histopathologic alterations are usually not associated with pigment, but include cellular infiltrations, vascular structures, and alterations of the thickness or the anatomy of the epidermis. Therefore, the selection of an equipment that preserves vessels' morphology and enhances their optimal visualization is much more crucial when evaluating skin eruptions than tumors. The "old-fashioned" nonpolarized handheld dermatoscopes require direct contact of the optical lens to the skin surface, which may result in alteration of the morphology, or even disappearance, of the

underlying vascular structures. Using for immersion ultrasound gel instead of liquid offers the possibility to apply less pressure and better preserve the morphology of the vessels. However, this problem was radically solved by the introduction of the second-generation handheld dermatoscopes, using polarized light and not requiring contact to the skin. In addition to eliminating the pressure problem, polarized dermoscopy offers also a better projection of vascular structures and allows the visualization of white shiny structures, which are hardly, or not at all, seen with nonpolarized light. In conclusion, we strongly advise the use of noncontact polarized dermatoscopes when applying dermoscopy in general dermatology.

Main categories of dermoscopic criteria

In general, each disease is dermoscopically typified by one or two predominant criteria. A "predominant" criterion is a structure seen in the larger part of the lesion, prevailing other coexisting features. The most frequent structures seen in inflammatory skin diseases are vessels, scales, or crusts and criteria associated to the hair follicle. Therefore, the most important parameters to be evaluated when dermoscopically examining skin eruptions are the following:

1. VESSELS

1A. Vessels morphology

Several morphologic types of vessels have been described in dermoscopy, including dotted, glomerular, comma like, hairpin like, arborizing, linear irregular, corkscrew like, and others.⁸ Some of these morphologic types have been associated with specific tumors (e.g., arborizing vessels with basal cell carcinoma or comma vessels with dermal nevi).⁹ However, the intraobserver agreement when evaluating the morphologic type of vessels has been assessed as low.¹⁰ Indeed, there is an obvious overlap between some of the previous terms, especially on linear vessels (linear irregular with arborizing, comma with hairpin, etc.). For this reason, but also because many of the aforementioned morphologic types of vessels

have not been reported to have a diagnostic significance for any inflammatory or infectious skin disease, we propose a simplified categorization when applying dermoscopy in general dermatology (Figure 0.1):

a. *Dotted vessels*. This category includes roundish vessels of any size, without discriminating dotted from pinpoint or globular vessels, which anyhow differ only in the diameter. Quite frequently, dotted vessels of different diameters are simultaneously present in the same lesion. Dotted vessels can be seen in the majority of the common inflammatory skin diseases. They have been initially described as the dermoscopic hallmark of psoriasis, but later it was shown that many other inflammatory dermatoses dermoscopically display dotted vessels, including dermatitis (all types), lichen planus, pityriasis rosea, porokeratosis, etc.¹¹

b. *Linear vessels* (not curved and without branches). Linear vessels are very frequently present in sun-damaged skin. They are also seen in lesions of any disease treated with topical steroids for long periods. The most frequent skin disease characterized by linear vessels is rosacea, which is typified by a specific arrangement the vessels in polygons (polygonal vessels).¹²

c. *Linear vessels with branches*. They are somehow similar to the typical vessels seen in basal cell carcinoma. They can be seen in granulomatous skin diseases (sarcoidosis, tuberculosis) and at the late stage of discoid lupus erythematosus.^{13,14}

d. *Linear curved vessels*. They are similar to the so-called comma vessels that are frequently seen in dermal nevi. They can be found in lichen planus, granulomatous disorders, and also in mycosis fungoides.^{11,15}

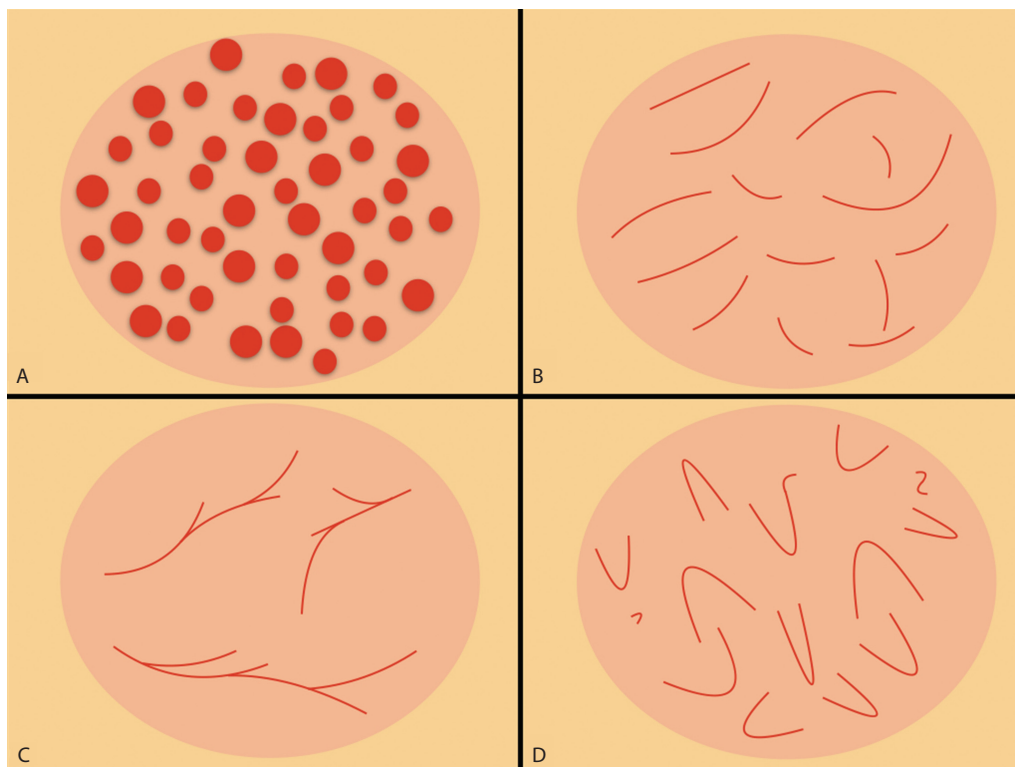


Figure 0.1 Morphologic types of vessels: dotted vessels of variable diameter (A), linear vessels not curved and without branches (B), linear vessels with branches (C), and linear curved vessels (D).

1B. Vessels distribution (Figure 0.2)

- a. *Regular*. This means that the vascular structures are equally and homogeneously distributed all over the surface of the lesion. This vascular arrangement typifies psoriasis.¹¹
- b. *Peripheral*. Vascular structures are distributed mainly at the peripheral part of the lesion. This arrangement is frequently seen in lichen planus.¹¹
- c. *Patchy*. The vascular structures are arranged randomly without following any specific pattern. It is also called asymmetric or unspecific distribution. It can be seen in many diseases, such as dermatitis and pityriasis rosea.¹¹
- d. *Reticular*. The vascular structures form a kind of network. This arrangement can be seen in psoriasis (dotted vessels) and is also very characteristic of rosacea (linear vessels).^{12,16}

2. SCALES

2A. Scales color (Figure 0.3)

- a. *White*. This is the most frequent scale color and can be found in most of the erythematous and papulosquamous skin diseases, such as psoriasis or lichen planus.⁴
- b. *Yellow*. Yellow crusts are a result of serum extravasation, and yellow scales, a result of serum mixed with keratin. Yellow crusts and scales represent the dermoscopic hallmark of all types of dermatitis, corresponding histopathologically to the underlying spongiosis.¹¹
- c. *Brown*. Pigmented parakeratosis might occur in several dermatoses and results in the presence of brown-colored scales. Exogenous pigment represents another possible cause of brown scaling.

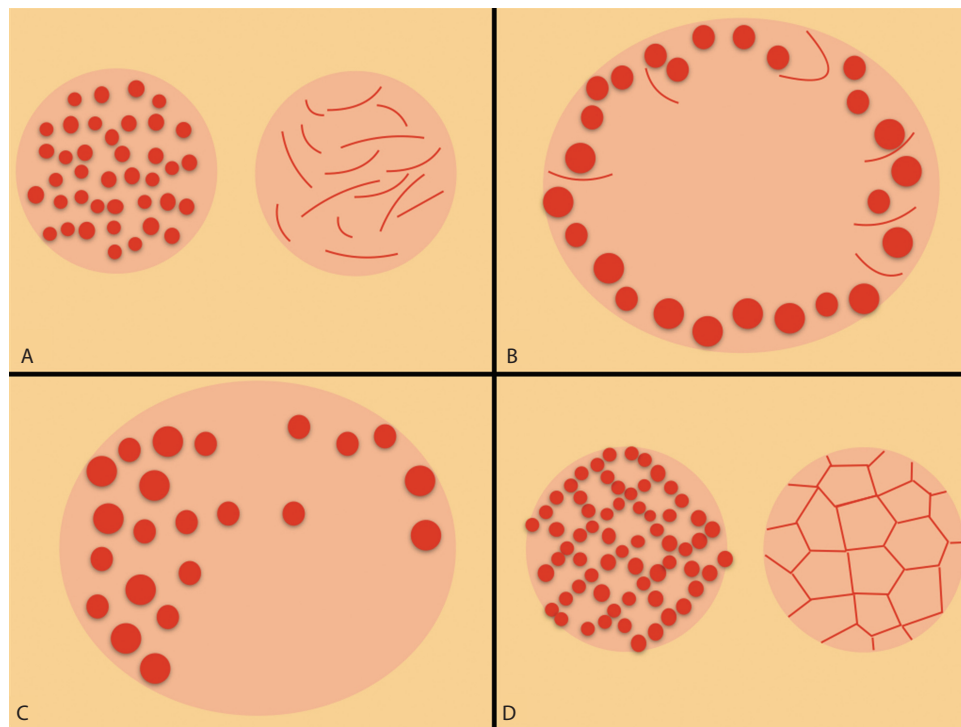


Figure 0.2 Possible distributions of vessels: regular (A), peripheral (B), patchy (C), and reticular (D).

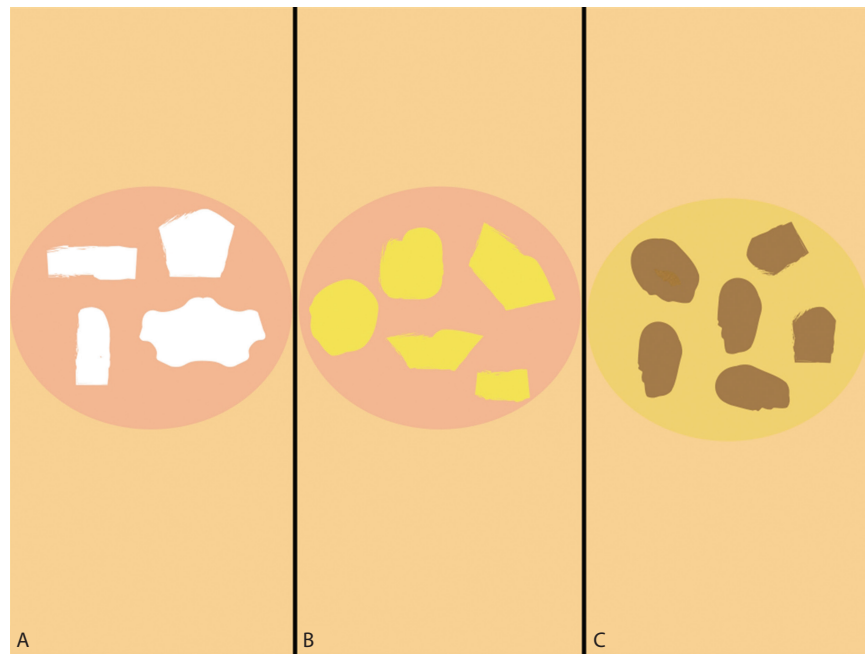


Figure 0.3 Color of scales: white scales (A), yellow crusts and scales (B), and brown scales (C).

2B. Scales distribution (Figure 0.4)

- a. *Diffuse*. Scales covering all the surfaces of the lesion. It cannot be considered specific of any diagnosis since diffuse scales can be seen in several hyperkeratotic dermatoses.
- b. *Central*. Scales accentuated in the center of the lesion. Again, this scaling pattern cannot be considered as specific, although it is quite frequently seen in psoriasis.
- c. *Peripheral*. Scales sparing the center and distributed mainly at the periphery. It is a classic sign of pityriasis rosea but can also be seen in tinea corporis and other entities.
- d. *Patchy*. Random and asymmetric distribution of scales. May be seen in several diseases.

3. FOLLICULAR CRITERIA

Inflammatory diseases primarily involving the hair follicles do exist, and in these entities, dermoscopy reveals follicular alterations as predominant features.

The main follicle-associated dermoscopic criteria are the following (Figure 0.5):

- a. *Follicular plugs*. Keratin plugs of white or yellow color filling the follicular openings. It can be found in several diseases but is considered as the dermoscopic hallmark of early stage discoid lupus erythematosus.¹⁴
- b. *Follicular red dots*. They represent a result of perifollicular inflammation and vasodilatation. Typically, they are seen in discoid lupus erythematosus but also in follicular mucinosis.
- c. *Perifollicular white color*. A white-colored circle surrounding each hair follicle and/or white color filling the space between follicles. It might correspond to perifollicular fibrosis (e.g., discoid lupus erythematosus), to epidermal hyperplasia (e.g., hypertrophic lichen planus), or to perifollicular depigmentation (e.g., vitiligo).^{3,14,17}
- d. *Perifollicular pigmentation*. Pigment accentuated around the hair follicles. It can be seen in some alopecias but also represents the first sign of repigmentation in vitiligo.³

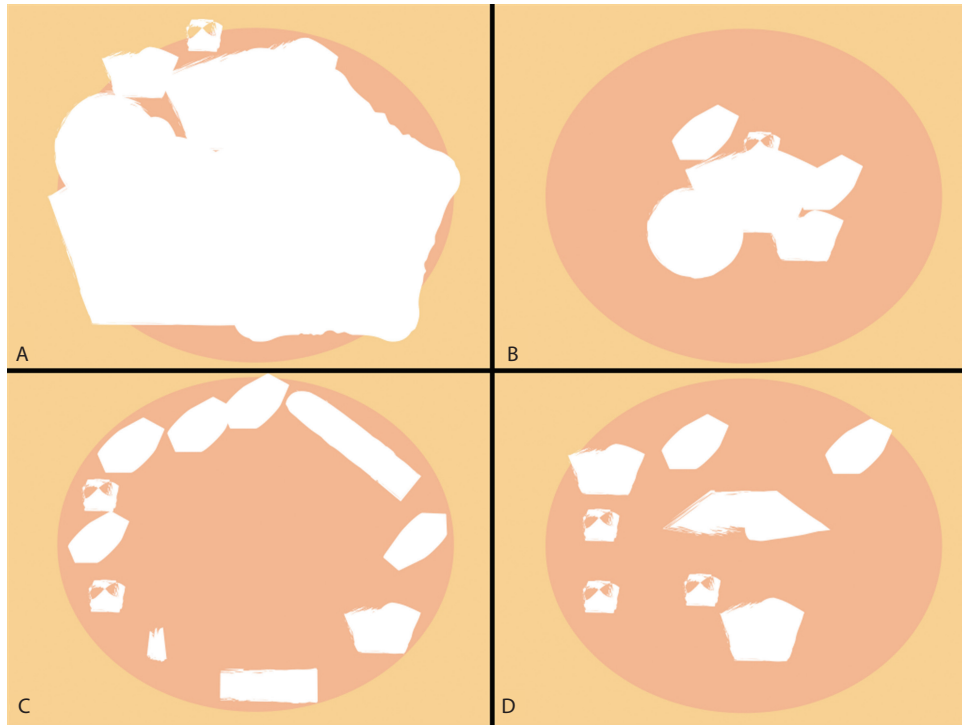


Figure 0.4 Possible distributions of scales: diffuse (A), central (B), peripheral (C), and patchy (D).

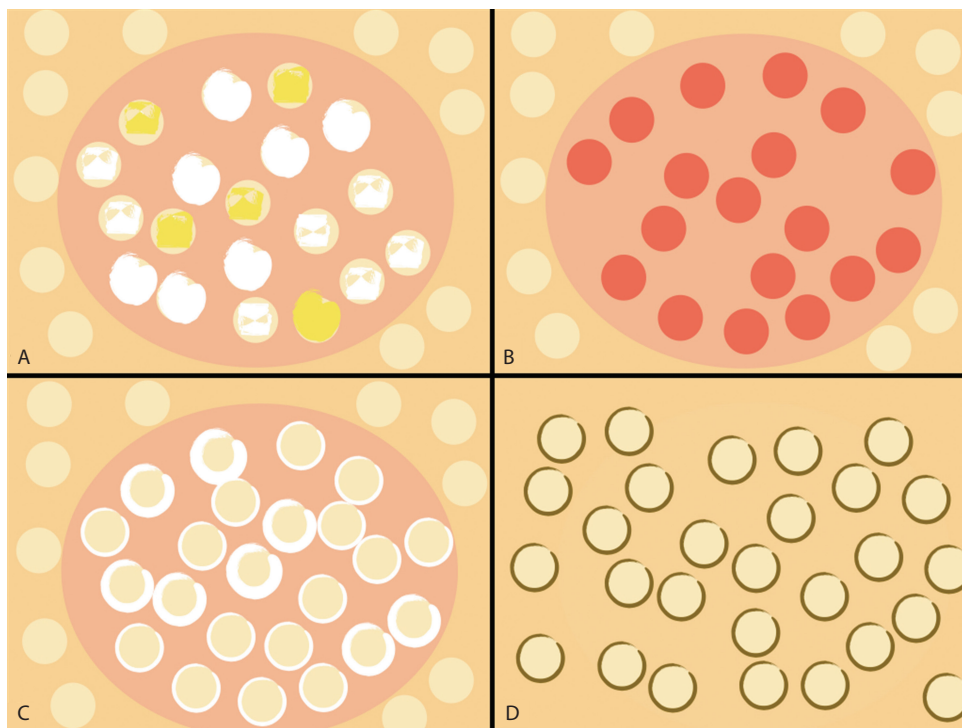


Figure 0.5 Follicular criteria: follicular plugs (A), follicular red dots (B), perifollicular white color (C), and perifollicular pigmentation (D).

4. OTHER STRUCTURES

Several structures other than vessels, scales, and follicular features may be seen in inflammatory, infiltrative, and infectious diseases. They represent a result of various histopathologic alterations including epidermal changes, cellular infiltrations, or deposits of melanin or other substances. These structures can be classified according to their color and shape as follows:

4A. Other structures—Color

- White*, which histopathologically might correspond to fibrosis, reduction of melanocytes or melanin, epidermal hyperplasia (acanthosis, hypergranulosis), or calcium deposits
- Brown*, corresponding to the presence of melanin in the basal layer of the epidermis or the superficial dermis
- Gray*, corresponding to the presence of melanin or ochronotic pigment in the papillary dermis

- Blue*, resulting from pigment deposits in the reticular dermis
- Orange*, which histopathologically corresponds to the presence of dermal granulomas, dense cellular infiltrations, or hemosiderin deposits in the dermis
- Yellow*, usually resulting from lipid deposits in the dermis
- Purple*, corresponding to extravasation of erythrocytes (purpura)

4B. Other structures—Shape (Figure 0.6)

- Structureless areas*. They might be diffuse, resulting in a relatively homogeneous background. Alternatively, they might be focal colored zones of unspecific shape, lacking any recognizable structure.
- Dots or globules*
- Lines*, which might be parallel, reticular, perpendicular, angulated, or unspecifically arranged
- Circles*

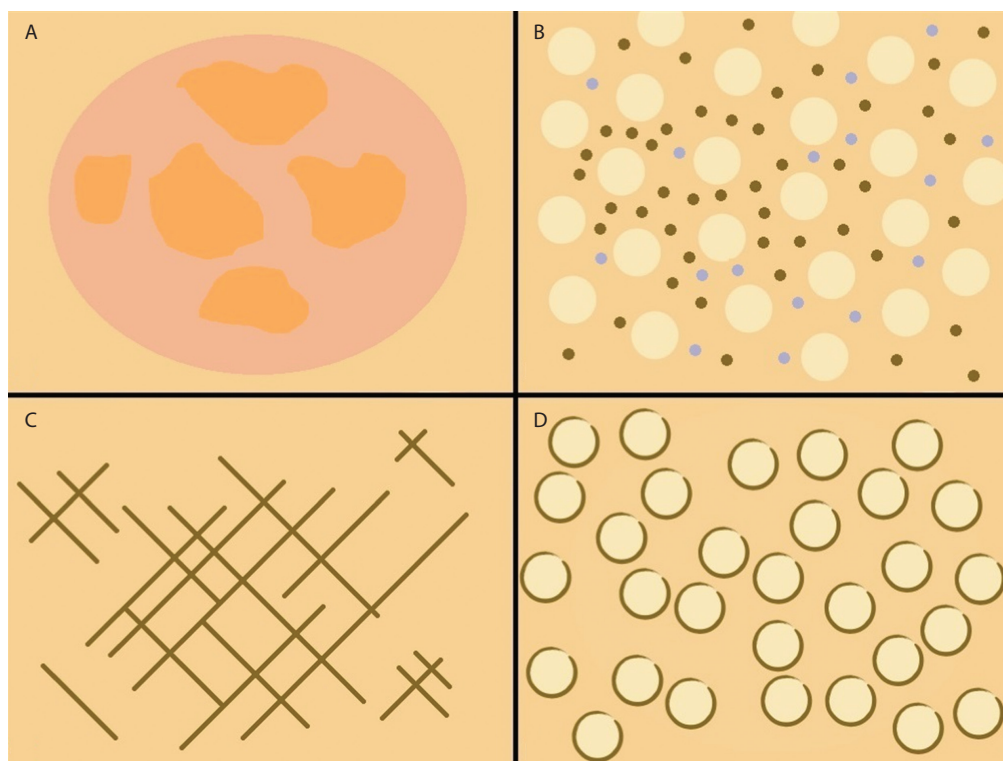


Figure 0.6 Other structures-shape: structureless areas focal (A), dots (B), lines (C), and circles (D).

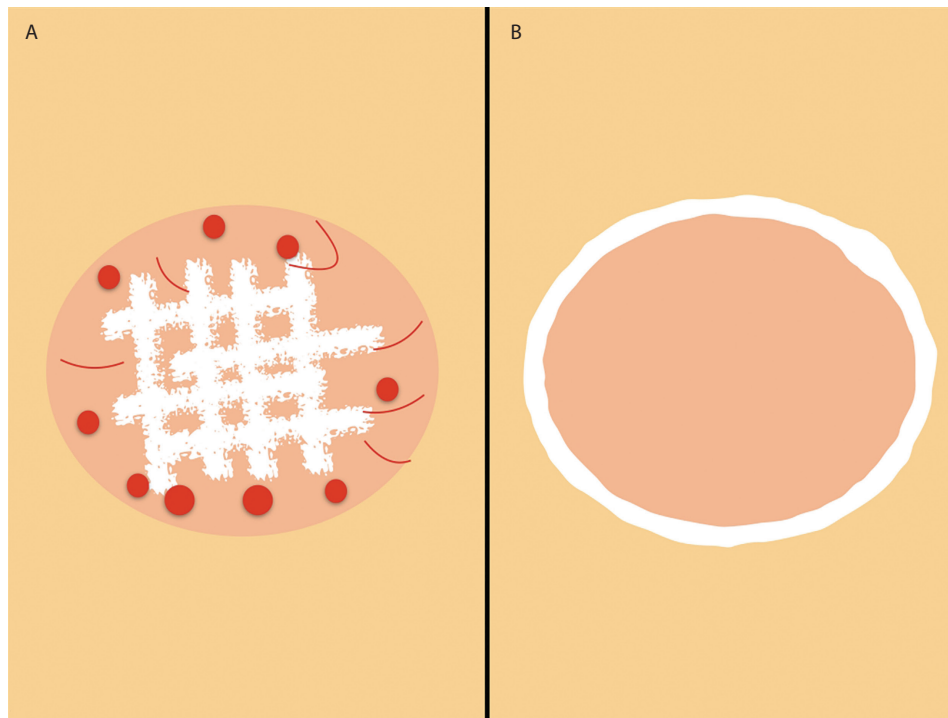


Figure 0.7 Examples of specific clues: Wickham striae of lichen planus (A) and white keratotic rim of porokeratosis (B).

5. SPECIFIC CLUES

Specific clue is considered a feature that, when present, is very strongly suggestive of only one diagnosis. Therefore, specific clues are features that can be seen in only one disease and not in any other entity, especially in those included in the differential diagnosis. Specific clues have been suggested for several diseases, but only a few have been investigated in appropriately designed studies that included control groups. Examples of specific clues are the white crossing lines of lichen planus (Wickham striae) and the peripheral keratotic rim of porokeratosis (Figure 0.7).^{18–21}

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Part I

Inflammatory Diseases

1 Papulosquamous disorders

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1.1 Psoriasis

1.1.1 INTRODUCTION

Psoriasis is a common, chronic, and recurrent inflammatory disease characterized by heritability, phenotypic variability, and possible association to psoriatic arthritis and metabolic syndrome. Psoriasis is considered as a hyperproliferative disorder, but this increased proliferation of keratinocytes is the result of a cascade of immunologic reactions driven by inflammatory mediator cells and cytokines.¹⁻³

1.1.2 CLINICAL PRESENTATION

Psoriasis is typified by the presence of well-demarcated, scaly erythematous plaques of various sizes, typically covered by adherent silvery scales (Figure 1.1). The most frequent sites of involvement are the scalp, elbows, and knees, followed by lower back, buttocks, nails, umbilical region, trunk, palms, and soles. However, psoriatic lesions might develop on any body site. The severity of manifestations varies from very few small plaques to involvement of the largest part of the skin (erythroderma).¹⁻³ The main clinical types of psoriasis are the following:



Figure 1.1 The typical psoriatic lesion: demarcated erythematous plaque with stuck-on white-silvery scales.

1.1.2.1 Plaque Psoriasis

Plaque psoriasis, also known as psoriasis vulgaris, is the most frequent clinical variant of the disease, typified by lesions as described earlier. Initially, the psoriatic lesions appear as red scaling papules that grow and coalesce to form round-oval plaques covered by thick silvery scales (Figure 1.2). The intensity of hyperkeratosis depends on the anatomic body site, being heavy on the scalp or palms and soles and absent in intertriginous areas (Figure 1.3). The scales are typically adherent in the center and looser at the periphery. When removed, small bleeding points appear (Auspitz sign). The most frequent anatomic sites of involvement have been mentioned previously. Psoriatic lesions may also develop on sites of physical trauma (Koebner's phenomenon). In general, the disease is asymptomatic. However, pruritus might be present in a considerable proportion of patients.¹⁻³



Figure 1.2 Psoriatic lesions often coalesce to form larger plaques.

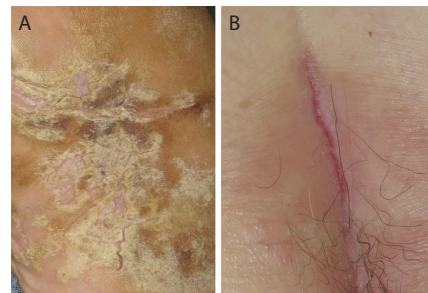


Figure 1.3 Palmar psoriatic lesion characterized by intense hyperkeratosis (A). Psoriatic lesion on the intergluteal fold lacks hyperkeratosis (B).

1.1.2.2 Guttate Psoriasis

Guttate psoriasis is characterized by the acute onset of multiple small, red, scaly papules, often following an acute infection, such as streptococcal pharyngitis (Figure 1.4). Guttate psoriasis might represent the first manifestation of psoriasis or may occur as an acute exacerbation of preexisting plaque psoriasis.¹⁻³



Figure 1.4 Guttate psoriasis is typified by small papules/plaques of recent onset located mainly on the trunk.

1.1.2.3 Inverse Psoriasis

This clinical subtype of psoriasis selectively involves folds (i.e., inguinal, gluteal, submammary, axillae, and groin) and the genital regions. Inverse psoriasis frequently occurs in patients who are obese.

Lesions of inverse psoriasis are red, well-demarcated plaques with no visible scaling that tend to stop at the junction of the skin folds.¹⁻³

1.1.2.4 Pustular Psoriasis

Several variants of pustular psoriasis do exist. Generalized pustular psoriasis (von Zumbusch) represents the most severe form of the disease, with patients being systemically ill. Typically, this form appears in patients with a history of psoriasis after withdrawal of systemic steroids used for a concomitant disease. The onset of the disease is usually acute, with the formation of sterile pustules at the edge of erythematous patches, periungually, and on the palms (Figure 1.5). These pustules may rapidly enlarge and become confluent, forming lakes of pus. Mucous membrane lesions are common, and the so-called “geographic” tongue is a frequent finding. Systemic symptoms include fever, diarrhea, arthralgias, and chills.¹⁻³



Figure 1.5 In generalized pustular psoriasis, multiple small pustules appear over erythematous patches.

Localized variants of pustular psoriasis may occur on the palmar and plantar surfaces, also known as palmoplantar pustulosis (Figure 1.6). This type is characterized by palmoplantar erythematous plaques on which pustules develop and subsequently crust, resulting in a tender and diffusely eroded surface. A specific form of palmoplantar pustulosis is acrodermatitis continua of Hallopeau, which is characterized by severe involvement of the fingertips and nailbeds.¹⁻³

Other less common forms of pustular psoriasis include annular pustular psoriasis (Milian-Katchoura) and pustular psoriasis of pregnancy (impetigo herpetiformis).¹⁻³



Figure 1.6 Palmoplantar pustulosis is typified by erythema, crusting, and pustules on the palmar and plantar surfaces.

1.1.2.5 Erythrodermic Psoriasis

This is an acute, severe form of psoriasis characterized by generalized erythema and extensive desquamation affecting more than 90% of the body surface area. Usually, patients are systemically ill with fever, chills, rigors, and arthralgias. The most threatening associated complications are electrolyte imbalance and sepsis.¹⁻³

1.1.2.6 Other Forms of Psoriasis

Several other types of psoriasis have been described, based on peculiar clinical manifestations that the disease might acquire. Some of them are psoriasis ostra-cea, psoriasis rupioides, psoriasis figurata, psoriasis gyrata, psoriasis discoidea, annular psoriasis, follicular psoriasis, etc. Clinical examples of some of these subtypes can be seen in Figures 1.14A–1.20A and 1.21.¹⁻³

1.1.3 DERMOSCOPY

Firstly described a decade ago, the dermoscopic pattern of psoriasis was recently further investigated concerning its value for differentiating the disease from other erythematous squamous dermatoses.⁴⁻⁶

Dotted vessels represent the commonest dermoscopic feature of psoriasis, being present in every single psoriatic plaque (Figure 1.7). Effectively, detection of any other morphologic type of vessels excludes the diagnosis of psoriasis.⁶⁻⁸

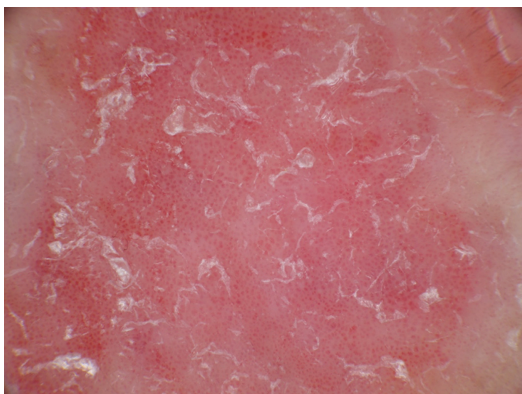


Figure 1.7 Regularly distributed red dots represent the dermoscopic hallmark of all types of psoriasis.

Regularly distributed dotted vessels might not be seen in psoriatic plaques only in the presence of thick superficial scales, which impede the visualization of underlying

vascular structures (Figure 1.8).⁹ Even on the latter hyperkeratotic lesions, removal of the scales will bring to light the characteristic vascular pattern of psoriasis, possibly together with tiny red blood drops, which can be characterized as the dermoscopic “Auspitz sign” (Figure 1.9).⁵

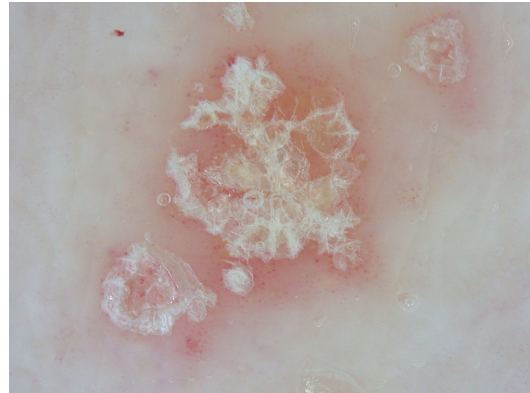


Figure 1.8 Thick scales impede the visualization of the vascular pattern in this psoriatic plaque.



Figure 1.9 Removal of the scales reveals not only dotted vessels but also a few punctate hemorrhages, corresponding to the “dermoscopic Auspitz sign” (circle).

The term “red globules” has also been used to describe the same dermoscopic feature.^{4,5} The distinction between dots and globules is based on the diameter of the structure (dots are smaller), and it might be important in dermoscopy of melanocytic tumors. In psoriasis, both terms may be used, since the roundish vascular structures can be of various diameters, although they are usually uniform in size within a given lesion. Under higher magnifications ($\times 100$ – $\times 400$), the psoriatic vessels appear as dilated, elongated, and convoluted capillaries.¹⁰ Histopathologically, red dots correspond to the loops of vertically arranged vessels within the elongated dermal papillae (Figure 1.10).