Dermatology: Basic Diagnostics

See online here

Your dermatology internship starts tomorrow and you haven't studied yet? No reason to panic! With these tips, you'll easily survive the chief physician's tests and you'll learn how to make a skin finding – which is relevant not only for future dermatologists.

Structure of the Skin

Before you begin to appreciate the nuances of the study of efflorescences, you should refresh your knowledge of the fundamental structure of the skin.

The skin is the largest organ in the body. It is the outermost covering of the body and it protects all parts of the body. It consists of three main layers (**epidermis, dermis**, and **subcutis**), which are close to each other and have different functions.

Epidermis (outer skin)

The epidermis consists of a **keratinized squamous epithelium**, which is mainly formed by **keratinocytes**. Along with the basal membrane, the **melanocytes filter ultraviolet radiation**. The **melanocytes** also synthesize the skin pigment and the Langerhans

(immune) and Merkel cells. The basal layer holds the stem cells of the skin. The skin is renewed regularly, starting from the basal layer.

The outermost covering of the skin, known as stratum corneum, protects the body from viruses, bacteria, and other foreign bodies. The epidermis, along with other layers of skin, protects the internal organs, muscles, blood vessels, and nerves from injury.

The epidermis contains neither lymphatic nor blood vessels.

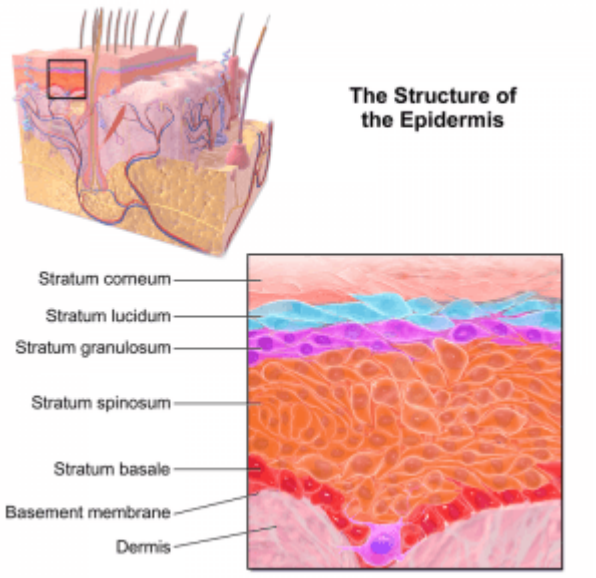


Image: The structure of the epidermis. By Blausen. License: CC BY 3.0.

Dermis (corium)

The **dermis** is a layer of the skin that consists of connective tissue. It is located between the epidermis and the subcutaneous fatty tissue. It is a thick layer formed by fibrous and elastic tissue. The **dermoepidermal junction** is n**ext to the line separating the epidermis and the dermis**, in which the basal membrane of the epidermis connects with the dermis. Rete ridges and anchoring fibrils ensure that under the impact of the shear forces, the epidermis does not detach from the dermis. Disruption in this area can lead to typical blistering illnesses.

The dermis contains blood and lymphatic vessels, nerve fibers and sensory receptors (e.g., Meissner’s corpuscles), hair, sweat, and sebaceous glands. Their distribution varies in different parts of the body. For example, multiple hair follicles exist on the head but not on the soles of feet. In addition to **fibroblasts**, which produce the extracellular connective tissue, **tissue macrophages, lymphocytes, and mast cells exist in the dermis**.

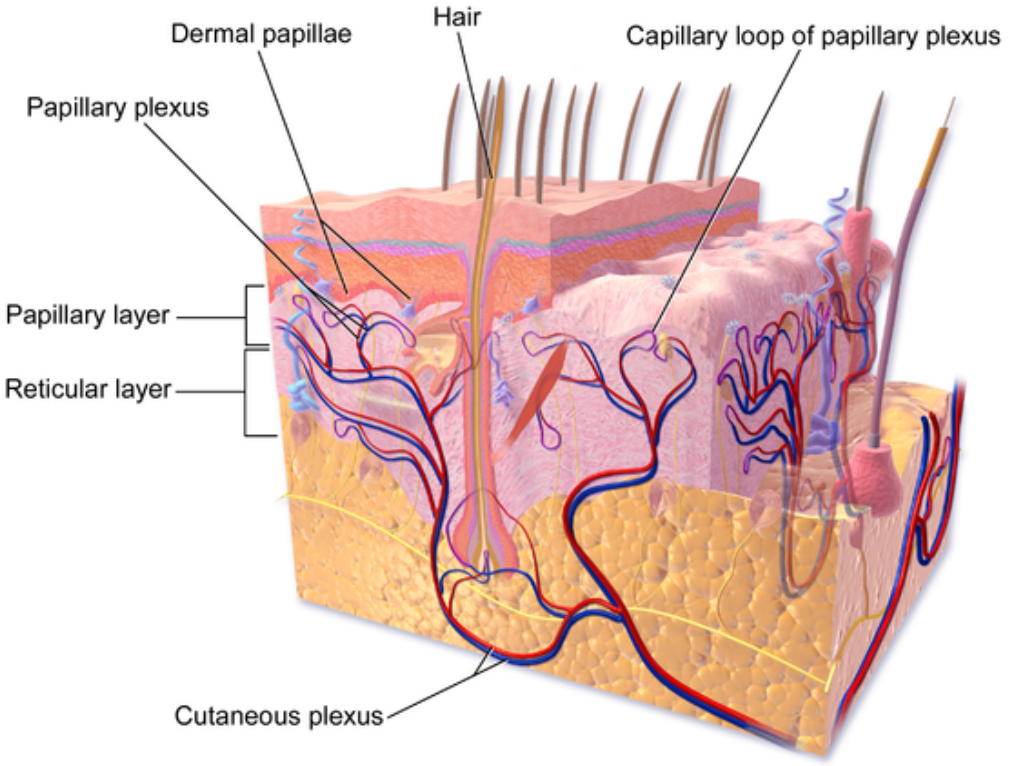


Image: The dermal circulation. By Bruce Blaus. License: CC BY 3.0.

Subcutis

The connective and fatty tissues underneath the dermis ensure mechanical protection and integrity of the skin. Fibrous and elastic tissues provide flexibility and elasticity.

Dermatologic Examination

Dermatology is primarily a **visual** field. Dermatologic evaluation is based on systematic and careful examination of the entire skin in daylight.

Disorders display wide variation depending on geography, seasonal changes in temperature, humidity, and environmental factors.

During an initial consultation, no part of the skin should be skipped. All of the following should be evaluated: hands and soles; inframammary, interdigital, inguinal, genital, axillary, and perianal regions; ears; adjacent mucous membranes such as those covering the lips; oral cavity; anus; conjunctivas; nose; skin appendages (hairs and nails); and scalp.

Note: During the examination, pay close attention to pigment changes, which are suspicious for melanoma, skin tumors, and *in situ* carcinoma.

In addition, the assessment should include the **overall skin condition**: complexion, condition, drought, turgor, and smell.

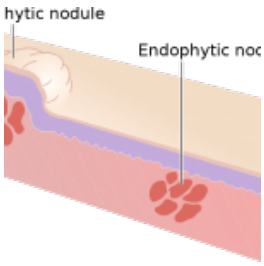
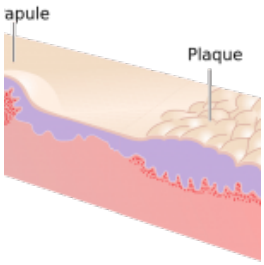
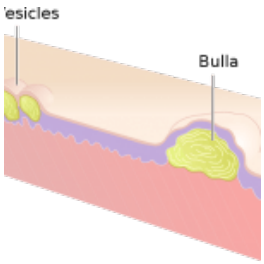
Description of skin findings

The skin texture, distribution, and color provide insight into skin condition or ailments. The description of cutaneous abnormalities during examination is facilitated by the **efflorescence gauge**. The efflorescence (the Latin *ex* means 'out' and *florescere* means 'flower'), the so-called flower of the skin, provides a uniform morphologic description of skin abnormalities and is the basis for communication between dermatologists. Therefore, the efflorescence gauge is a kind of code that can be used to describe nearly all of the pathologic skin changes using a few terms and modifications.

The efflorescences are divided into **primary efflorescences**, which arise on healthy, unchanged skin and are a direct consequence of the illness, and **secondary efflorescences**, which are the secondary changes that accompany primary efflorescences.

Primary efflorescences

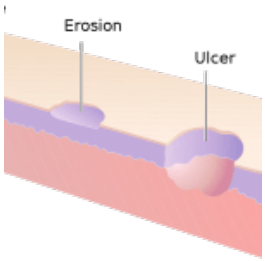
Efflorescence	Definition	Example
Macules (spots)  Image: Macules (café au lait spots). By Accrochoc. License: CC BY-SA 3.0.	Outlined color change, with no increase in the amount of the substance. Different colors are possible. These are nonpalpable and are not raised or depressed relative to the skin.	Red: increased circulation (erythema), bleeding in the skin (purpura); blue: hematoma; white: decreased melanin, e.g., vitiligo; brown: increased melanin
Urticaria (wheals)  Image: Urticaria. By Templeton8012. License: CC BY-SA 3.0.	Volatile protrusion of the skin caused by serum exudates	Mosquito bites, drugs, stings, autoimmune reactions
Papule (nodules)  Image: Papules. By M. Sand, D. Sand, C. Thrandorf, V. Paech, P. Altmeyer, and F. G. Bechara. License: CC BY 2.0.	A substance raises the skin higher than its normal level; the area has a diameter less than 0.5 cm. It can be palpated, or felt.	Lichen ruber, insect bites, seborrheic keratoses, warts, skin cancers

Nodes (knots)  Image: Nodules. By Madhero88. License: CC BY-SA 3.0	A substance raises the skin higher than its normal level; the area has a diameter less than 0.5 cm.	Skin tumor
Plaque  Image: Papule and plaque. By Madhero88. License: CC BY-SA 3.0.	Flat sublime increase of substance in the skin; palpable, elevated, or depressed lesions relative to skin	Eczema, psoriasis
Bulla (blister) and **vesicle** (bubbles)  Image: Vesicles and bullas. By Madhero88. License: CC BY-SA 3.0.	This cavity filled with liquid (e.g., serum, blood) is possible in each of the three layers of the skin.	Pemphigus vulgaris, herpes simplex, burns, allergic contact dermatitis
Pustule  Image: Acne. By Diariodaj. License: Public domain.	This cavity filled with pus is possible in each of the three layers of the skin.	Folliculitis, acne, psoriasis, pustulosa

Secondary efflorescences

While the primary efflorescences occur on healthy skin, secondary efflorescences accompany pre-existing primary efflorescences.

Efflorescence	Definition	Example
Squama (scale)	Thickening of the horny layer (stratum corneum) of the epidermis, whitish sheds	Psoriasis, tinea
Erosio (erosion)	Superficial defect of the substance of the epidermis, healing without scars	Pemphigus vulgaris, inflammatory diseases

Excoriation (artifact of scratching)	Defect formed by a substance, which manifests through to the upper dermis; possibly scars of healed defects	Abrasions, itching illness of the skin
Crust (crust)	Dried-up secretions	Serum, blood, or pus from smaller wounds, infections, inflammatory diseases
Ulcer (ulceration)	Defect formed by a substance, which involves at least the lower dermis, associated with poor healing and obligatory scarring	Venous stasis dermatitis, infections, vasculitis; ulcer cruris  Image: Ulcus cruris. By Redlinux. License: CC BY-SA 3.0
Rhagade	Crack-shaped tears of brittle skin that appear in natural skin folds such as the corners of the mouth and the hands	Hyperkeratotic rhagadiforme eczema of the hand, cracks at the corners of the mouth
Cicatrix (scar)	Wound closure with collagenous connective tissue after a deep defect of the substance; possibly hypopigmented or hyperpigmented, caved-in, sublime or skin level	Scar after ulcer or trauma  Image: Ulcer and erosion. By Madhero88. License: CC BY-SA 3.0
Atrophy (skin thinning)	Tissue loss in the area of multiple skin layers; thinning of the epidermis and dermis	Atrophy because of steroids or age, sun exposure, inflammatory diseases, neoplastic diseases
Lichenification	Thickening of the skin with oversimplifying lichenification	Atopic eczema

Description of the findings

The dermatologic findings should also always be used to assess the overall clinical picture. A step-by-step approach can be helpful.

First, start with the description of the **location** (area of the body) as well as the number of **effloreszences** (solitary, several, or numerous herds). Based on this description, it can be determined whether it is a **localized** or a **generalized** phenomenon.

The following terms can be used to provide a more accurate description:

- **Disseminated** (sowed)
- **Diffuse** (fuzzy limited, extended)
- **Generalized** (disseminated over the whole body)
- **Grouped** (identical skin changes lying directly next to each other)
- **Confluent** (passing into each other)
- **Solitary** (appearing individually)
- **Multiple**

- **Homogeneous**
- **Heterogeneous**

Subsequently, the **morphologic description** should include the size and form, limitation, color, consistency, and quality of the efflorescence; it should be measured, if necessary, and the specific length or the length by comparison with xxxxx.

In general, an efflorescence that is located more deeply has a sharper limitation. The color of **inflammatory** efflorescences can reveal its localization: In the upper dermis, the efflorescences are mostly sharp, limited, and bright red, whereas in the deeper layers, the limitation is blurred and the color is purple. The reaction to pressure can be tested with a glass **spatula**: Is the efflorescence movable? Does the color change under pressure?

Note: To assess efflorescences adequately, they need to be touched. Closing your eyes while doing so may be helpful.
The description of attendant symptoms such as signs of inflammation (**erythema**, overheating), pain, **pruritus** (itching), **exudation**, and burning completes the skin findings.

Anamnesis

Anamnesis is used to elucidate disease pathogenesis to provide a diagnosis, supported by previous findings and other relevant data. Anamnesis is the first important contact with patients before they undress for examination. It is important to proceed gently and to turn from open, general questions to more 'intimate' topics. Ask in a specific, unaggressive way. When in doubt, the relationship of trust between doctor and patient should not be compromised for the sake of a single question.

Important questions for anamnesis

- When exactly did the symptoms/skin changes start?
- Where exactly did the skin changes start to appear?
- Do the skin changes lead to subjective physical symptoms, such as pain, itching, or feelings of hot or cold?
- What did the skin changes look like at first? Did they change? How did they spread?
- Do symptoms of these skin changes disturb normal activities such as sleep?
- What has been done so far to treat your skin changes?

Note: Patients often understand terms such as *blister, wheals, eczema,* and similar terms differently from how these terms are defined in dermatology. Therefore, it is important to ask patients about their understanding of the different terms. Additional clues can be obtained via questions related to previous diseases of the skin/known illnesses, allergies, attendant symptoms such as fever, weight loss, and reduced general condition, previously consumed medicine, contact with noxious agents or chemical substances, and habits.
Questions related to the **family's anamnesis**, as well as journeys abroad, can provide important insights. Last but not least, the **psychosocial condition** of the patient as well as personal impairments caused by the skin changes should be examined.

Clinical Testing

Simple **clinical tests** can be conducted during the examination; these provide important diagnostic information. A simple test such as **palpation** provides information about consistency, mobility, painfulness, soreness, warmth or coldness of the skin, pulsation, and other characteristics of the efflorescence.

Crusts can be removed to assess wound expansion. In these cases, the **secretion** is removed so that it can also be assessed.

Furthermore, there are specific clinical signs that provide clues for specific dermatologic conditions or other illnesses.

Dermographism

In dermographism, the skin is irritated with a blunt object (e.g., a spatula made of wood) and the reaction is evaluated. The resulting reddish wheals normally disappear quite quickly. A **red dermographism** may occur after 15 seconds; this is a sign of local vasodilatation (capillary dilatation) that leads to significant redness in the form of lines. A **reflective vasodilatation** (arterial dilatation) can produce a **reflex erythema**, resulting in the formation of linear wheals due to fluid transudation. This is known as the 'triple response of Lewis.'

A **dermographism with an urticarial origin** can occur a few minutes after the red dermographism and may possibly last for minutes. The local release of histamine, particularly via interaction of an antigen with immunoglobulin E (IgE), leads to swelling of the stretched patterns and itching.

A white dermographism (**dermographism albus**), noticeable as a white stripe on the skin, is a sign of local **vasoconstriction** and suggests an atopic tendency, i.e. a tendency toward hypersensitivity reactions such as atopic dermatitis (**neurodermatitis, atopic eczema**).

Image: Dermographic urticaria resulting from pressure through clothing. By Openi. License: CC BY 3.0.

Auspitz phenomenon

Heinrich Auspitz.

Also known as the phenomenon of the bloody rope, the Auspitz phenomenon is diagnostic of **psoriasis**. It can be defined by the appearance of small isolated bleeding points on the surface of the skin after the removal of scales of psoriatic papules or plaques. If you scratch the scales of a **psoriasis plaque** with a spatula made of wood, the inflammatory dermis appears underneath. If you scratch the exact same spot again with a wooden spatula, the dermis is opened and punctual bleeding originating in the blood vessels of the **papillary top** occurs.

Technical Tools

Various dermatologic tools are available to examine the skin. In addition to the wooden spatula, which is used to trigger a dermographism, a **spatula made of glass,** a **magnifying glass**, and a **dermatoscope** are used. In addition, **Wood's lamp** (which gives off ultraviolet A (UVA) radiation), **sonography**, and histologic procedures are used during the diagnostic evaluation.

Spatula made of glass (diascopy)

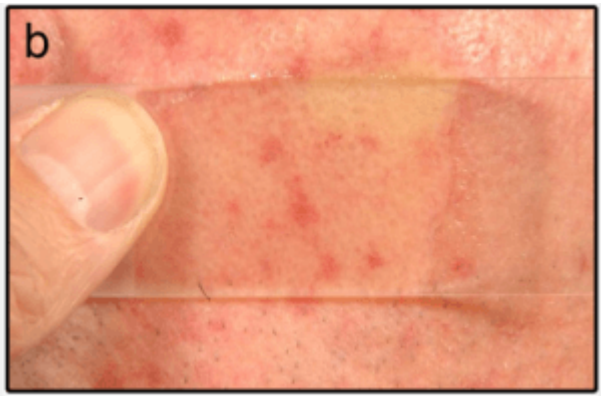


Image: Clinical appearance of centrofacial telangiectasia (TAE) in patients after 10 months of treatment with iloprost or bosentan. Shown is diascopy of the cheek of a 57-year-old man treated with bosentan. By Openi. License: CC BY 2.0.

The **glass** (or transparent plastic) **spatula** can be used to measure the efflorescences. Using a spatula, pressure is exerted on the efflorescence, to distinguish **bleeding** (erythema, which cannot be pushed away) from **vascular** (which can be pushed away) **dilations**.

Incident light microscope (dermatoscope)

Image: Heine delta 10 dermatoscope. By Frank33. License: CC BY-SA 3.0.

Dermatoscopy is a **noninvasive** procedure that can be used to assess the superficial skin layers. The dermatoscope has a 10-fold to 100-fold magnification. An important area in which the dermatoscope is used is in the classification of **skin tumors** (pigmented and nonpigmented).

Note: The ABCDE rule for the evaluation of skin tumors includes consideration of asymmetry, border (irregular), color, diameter, (> 5 mm), and evolution.

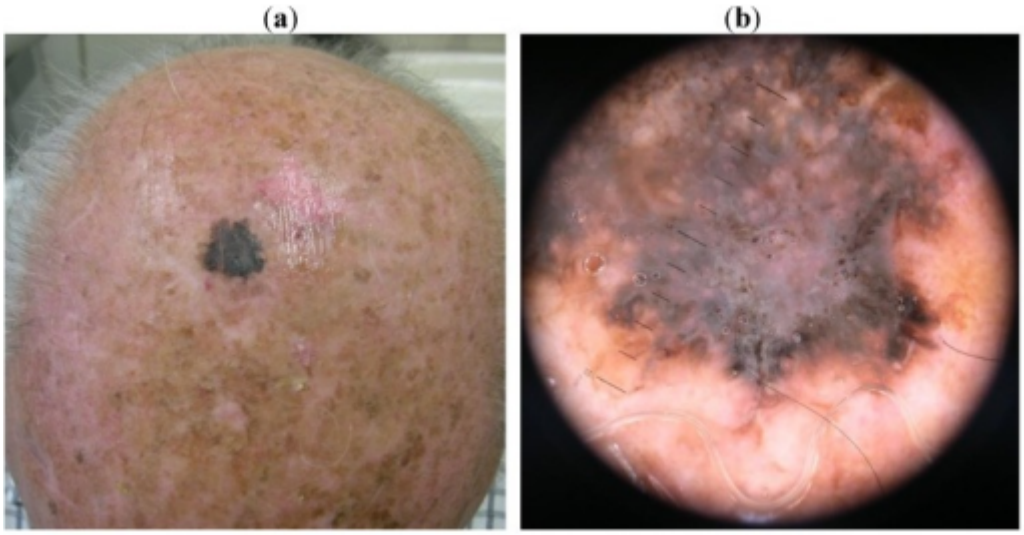


Image: (a) Naked-eye aspect: a 13-mm black patch with irregular borders. (b) Dermatoscopic aspect: a black rhomboidal structure, peripheric dots, irregular streaks, and a central white-blue veil. By Openi. License: CC BY 3.0.

Sonography

Medium-frequency sonography (7.5–10 MHz) can reveal deep **skin layers, veins,** and **lymphatic nodes**. It is important in the preliminary diagnosis of malignant tumors and the examination of primary tumor and regional lymphatic nodes. Any suspicious lymphatic nodes are investigated during the planning and diagnostic phases as well as during follow-up and therapeutic monitoring visits.

High-frequency sonography (20–50 MHz) is used for the examination of the epidermis, dermis, and subcutis, for example, in the preoperative measurement of the thickness of malignant melanoma.

Wood’s lamp examination

The **UVA radiation** (365 nm) emitted by the Wood’s lamp can produce colored fluorescence of hair and skin in cases of specific skin alterations. Green fluorescence appears in cases of **microspore**, red fluorescence in **erythrism**, and white fluorescence in onychomycosis and **vitiligo**.

Histologic procedure

In cases of ambiguous diagnosis or to confirm a diagnosis, a **biopsy of the skin** can be performed. In this procedure, parts of the skin changes are excised by punching out cylinders or small spindles of the skin. After fixation of the tissue sample, it can be histologically examined microscopically to detect and identify the skin disease.

In addition to evaluation of the epidermis, dermis, and subcutis, it is possible to evaluate cancerous processes or autoimmunologic illnesses using **immunohistochemical analyses** (antigen–antibody reactions), as well as **immunofluorescence**.

Notes