Introduction 1

Human skin consists of a stratified, cellular epidermis and an underlying dermis of connective tissue, separated by a dermal–epidermal basement membrane (Figure 1.1). Beneath the dermis is a layer of subcutaneous fat, which is separated from the rest of the body by a vestigial layer of striated muscle.

The skin performs a number of functions, including:

- Providing a physiological barrier against the external environment.
- Maintaining fluid balance by restricting water loss through the skin.
- Forming an innate immune defence against bacteria, fungi and viruses through keratinocyte-derived endogenous antibiotics, defensins and cathelicidins. Langerhans cells have a primary role in epidermal immune surveillance.
- Supporting thermoregulation: vasodilatation or vasoconstriction of the blood vessels in the deep and superficial plexuses helps to regulate body temperature. Eccrine sweat glands, found at all skin sites, also play a role in heat control.
- Providing insulation and trauma protection: subcutaneous fat limits excessive heat loss and shields internal structures from physical trauma.

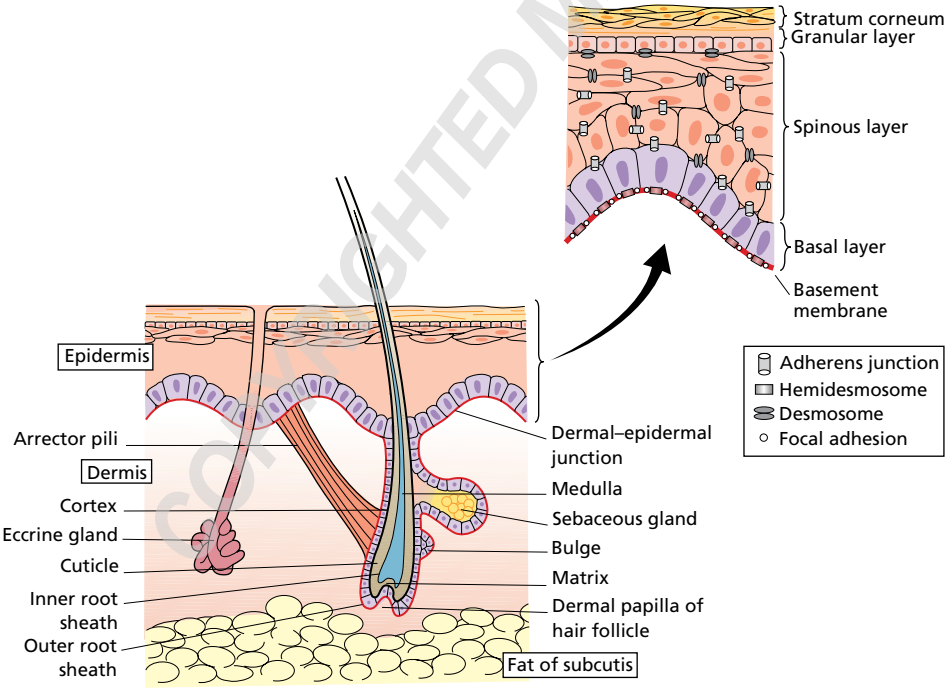

Figure 1.1 The skin and its appendages.

Rook's Dermatology Handbook, First Edition. Edited by Christopher E. M. Griffiths, Tanya O. Bleiker, Daniel Creamer, John R. Ingram and Rosalind C. Simpson.

Fat also has an endocrine function, releasing the hormone leptin, which acts on the hypothalamus to regulate hunger and energy metabolism.
- Vitamin D production.
- Performing a psychosocial function: the appearance of human skin and its associated structures, especially scalp hair, has a major impact on self-image and thus on interpersonal relationships.
- Protection from ultraviolet (UV) radiation through production of melanin from melanocytes. Variation in response to sunlight has historically been divided into six categories according to the Fitzpatrick classification (Table 1.1). It is acknowledged that whilst these 'skin types' describe response to UV exposure, they do not adequately encompass the wide variation of tones seen in skin of colour.

History taking

Clinical assessment of a patient presenting with a skin disorder follows the standard approach of history-taking and physical examination. Investigations may be needed to supplement information obtained at the consultation.

Although a dermatological diagnosis might be swiftly apparent, it is essential to take a full history before examining the skin. The history of the presenting complaint will yield the story of the symptoms and the clinical features of the dermatosis (Box 1.1). Further questions will give details about any associated clinical problems and the patient's background medical history (Table 1.2). The act of questioning (and listening to the answers) contributes to a consultation's therapeutic function.

Table 1.1 Fitzpatrick classification of skin types

Skin type	Skin colour on sun-protected site	Sunburn risk	Tanning ability	Skin cancer risk
I	White	++++	±	High
II	White	+++	+	High
III	White	++	++	Moderate
IV	Olive	+	+++	Moderate
V	Brown	±	++++	Low
VI	Black/dark brown	±	++++	Low

Box 1.1 History of the presenting complaint

Essential points in the history: rashes

- Location: Where did the rash start, where did it spread to?
- Temporal: When did it start, does it come and go, if so, how long does it last?
- Exacerbating factors: What makes it worse?
- Alleviating factors: Physical factors, diet, treatment?
- What are the predominant symptoms: itch, pain, disfigurement?
- Occupational factors: Does it get worse at work? Does it improve away from work?
- Open questions: Do you have any thoughts as to what has caused this? What concerns you most about this problem?

Essential points in the history: lesions

- Where is the lesion? Is it single or multiple?
- Was there any trauma before it arose?
- Temporal: How long has it taken to develop to this size? Is it still growing or is it resolving?
- Symptoms: Is it tender, painful or itchy? Are there any exacerbating factors? Has it bled?
- Past history: Have you had anything similar before?
- Sun exposure: How much sun exposure have you had, including living/ working abroad and use of sun beds? Any history of blistering sun burns?

Table 1.2 Background medical history

Further history	Rationale	Example
General medical history	Systemic diseases may have cutaneous features	Dermatomyositis and other connective tissue disorders
Medication history	Certain dermatoses are induced by drugs	Drug-induced exanthem
Allergy history	Certain dermatoses are caused by an allergy to a food or drug or contact allergen	Oral allergy syndrome
Family history	Certain dermatoses are inherited	Basal cell carcinoma syndrome (Gorlin syndrome)
Occupational history	The trigger for a dermatosis may be found only at the patient's workplace	Allergic contact dermatitis in a hairdresser
Leisure history	Certain dermatoses are related to leisure activities	Allergic contact dermatitis to plants in gardening
Travel history	Certain dermatoses are more commonly encountered abroad	Leishmaniasis
Social history	Certain dermatoses are associated with lifestyle habits	Palmo-plantar pustulosis is associated with smoking
Ethnicity	Certain disorders are more prevalent in particular ethnic groups	Sarcoidosis and lupus erythematosus occur more frequently in patients with black skin
Quality of life	Effects of dermatosis on work, relationships, activities etc. can be quantified	Dermatology Life Quality Index

Clinical examination

As in any medical consultation, examination follows history-taking and the correct assessment of skin signs is only achieved in the context of a patient's symptoms. Effective interpretation of cutaneous clinical features relies on the principle that most skin diseases have characteristic lesions with a predilection for certain body sites. An understanding of these disease-specific patterns is intrinsic to diagnosis in dermatology, an assertion which is especially true in the appraisal of a rash.

The patient should always be examined in a good light, preferably daylight, and with magnification of lesions if necessary. A mobile light on a flexible stand can be helpful in illuminating areas that are in the shade from overhead lights, such as the mouth and the flexures. Ideally, the entire skin should be examined in every patient, including the scalp and nails. Full skin examination may also reveal suspicious skin lesions that the patient was not aware of, for example lesions on the back.

Examination of a lesion

When assessing a solitary skin lesion there are a number of features relating to its morphology which direct the physician to a diagnosis. All skin lesions can be assigned to one of the descriptive entities defined in Table 1.3 (illustrated in Figure 1.2). Recognition of the lesion type is the basis of clinical examination in dermatology. Thereafter a more detailed appreciation of the lesion's properties will enhance the assessment. Use of the 5**S**s is helpful in describing, and thus identifying, a lesion: **S**ite, **S**ize, **S**ymmetry, **S**hape and **S**urface.

Table 1.3 Descriptive terms for cutaneous lesions (adapted from Nast et al. 2016)

Term	Definition	Example
Bulla (Figure 2a)	A circumscribed lesion >1 cm in diameter that contains liquid (clear, serous or haemorrhagic)	Bullous pemphigoid
Macule (Figure 2b)	A flat, circumscribed, non-palpable lesion that differs in colour from the surrounding skin	Junctional naevus
Nodule (Figure 2c)	An elevated, solid, palpable lesion >1 cm usually located primarily in the dermis and/or subcutis	Squamous cell carcinoma
Papule (Figure 2d)	An elevated, solid, palpable lesion that is ≤1 cm in diameter	Intradermal naevus
Patch (Figure 2e)	A flat circumscribed area of discoloration, >1 cm	Vitiligo
Plaque (Figure 2f)	A circumscribed, palpable lesion >1 cm in diameter; most plaques are elevated	Psoriatic plaque
Pustule (Figure 2g)	A circumscribed lesion that contains pus	Palmoplantar pustulosis
Vesicle	A circumscribed lesion ≤1 cm in diameter that contains liquid (not pus)	Herpes simplex
Weal	A transient elevation of the skin due to dermal oedema	Urticaria
Scale (Figure 2h)	A visible accumulation of keratin, forming a flat plate or flake	Psoriasis
Crust	Dried serum, blood or pus on the surface of the skin	Impetigo
Erosion	Loss of either a portion of the epidermis or the entire epidermis	Pemphigus vulgaris
Excoriation	A loss of the epidermis and a portion of the dermis due to scratching or an exogenous injury	Scratching from any cause
Ulcer	Full-thickness loss of the epidermis plus at least a portion of the dermis	Venous leg ulcer

Source: Adapted from A. Nast et al. The 2016 International League of Dermatological Societies' revised glossary for the description of cutaneous lesions. British Journal of Dermatology, 2016, 174, pp. 1351–1358. John Wiley & Sons Ltd on behalf of the British Association of Dermatologists.

Examination of a rash

In the initial assessment of a rash the type of primary lesion, from which the dermatosis is constituted, needs to be identified. Thereafter the configuration of lesional skin on the skin's surface will point to the diagnosis, a deductive process termed pattern recognition. The description of a rash should comment on the morphology of individual lesions, including colour and shape (Table 1.4), as well as information on body sites of involvement and distribution pattern (Table 1.5) (illustrated in Figure 1.3). Palpation of lesional skin imparts additional information about texture, skin thickness, tenderness and temperature.

Medical photographs

Medical photography is a useful tool to record the current state of a dermatosis and to permit serial comparisons over time to assess change. Patient consent and secure image storage are important considerations.

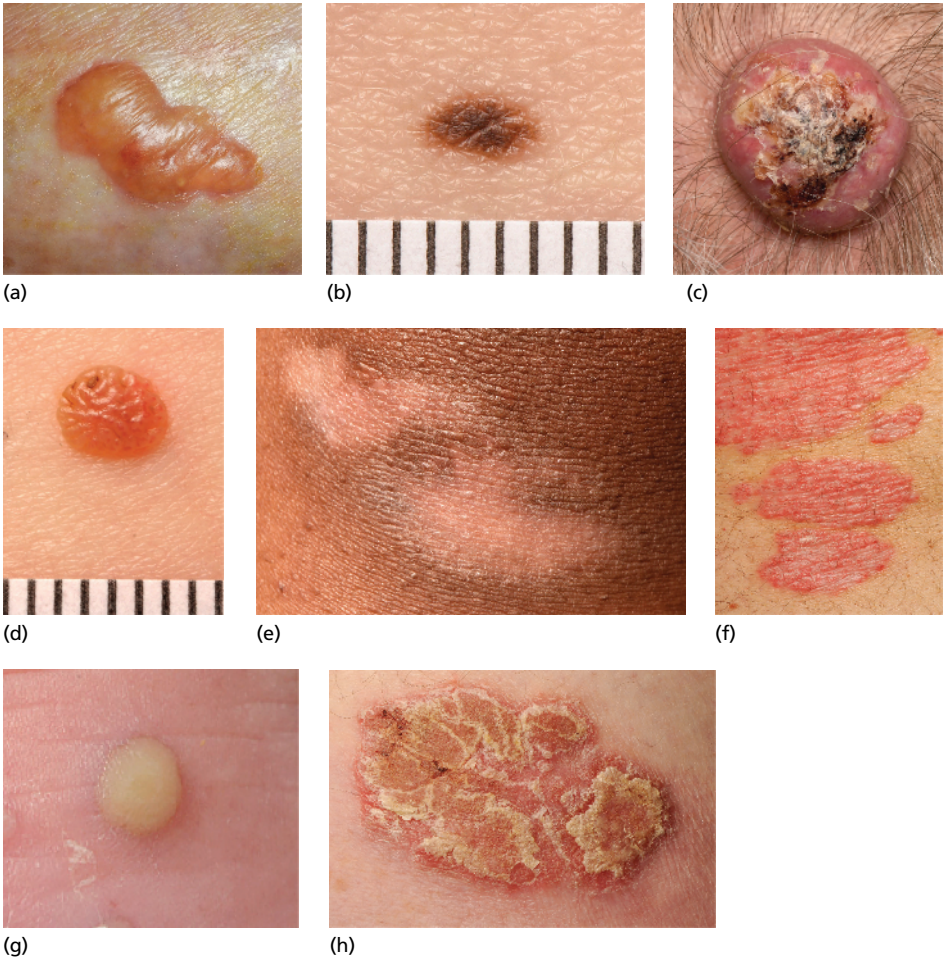

Figure 1.2 Types of cutaneous lesion: (a) bulla: bullous pemphigoid; (b) macule: junctional naevus; (c) nodule: squamous cell carcinoma; (d) papule: intradermal naevus; (e) patch: vitiligo; (f) plaque: psoriasis; (g) pustule: palmoplantar pustulosis; (h) scale: psoriasis. (Source: Reproduced with permission of Cardiff and Vale University Health Board.)

Bedside tests

Dermoscopy

(Syn. Dermatoscopy)

A dermatoscope (Syn. Dermoscope) provides polarised light and magnification to aid examination of the skin. The dermatoscope lens is applied to the skin surface with a film of oil on the lesion to enhance examination of subcorneal structures. Analysis of the colours and appearances of structural elements, such as the pigment network, is especially useful in the diagnosis of pigmented lesions. The images may be viewed directly, photographed or recorded digitally for subsequent or sequential analysis. Dermatoscopes can also be useful in distinguishing haemangiomas, angiokeratomas, pigmented basal cell carcinomas and seborrhoeic keratoses. Additional uses include the identification of scabies mites and other parasitic infections. Trichoscopy is use of a dermatoscope for hair and scalp lesions, and aids diagnostic accuracy in scalp disorders.

Table 1.4 Shapes of cutaneous lesions (adapted from Nast et al. 2016)

Term	Definition	Example
Acuminate	Elevated lesion with a sharp point	Cutaneous horn
Annular (Figure 3a)	Shape of a ring (clear centrally)	Tinea corporis
Arciform, arcuate	A segment of a ring; arch-like	Erythema annulare centrifugum
Digitate	Finger-shaped	Digitate dermatosis, a form of parapsoriasis
Discoid; nummular (Figure 3b)	Circular or coin-shaped	Nummular eczema
Linear	Lesional skin forming a band or line	Lichen striatus
Papillomatous	Lesion with multiple surface projections	Epidermal naevus
Pedunculated	Papule or nodule attached by a thinner stalk	Skin tag
Polymorphic	Variable sizes and shapes as well as types of lesions	Acne vulgaris
Polycyclic	Coalescence of several rings	Subacute cutaneous lupus erythematosus
Reticulate (Figure 3e)	Net-like or lacy pattern	Mucosal lichen planus
Serpiginous (Figure 3c)	Wavy pattern, reminiscent of a snake	Cutaneous larva migrans
Targetoid	Lesion composed of concentric rings	Erythema multiforme
Umbilicated	Lesion with a small surface depression	Molluscum contagiosum
Verruciform	Lesion with multiple projections resembling a wart	Viral wart

Source: Adapted from A. Nast et al. The 2016 International League of Dermatological Societies' revised glossary for the description of cutaneous lesions. British Journal of Dermatology, 2016, 174, pp. 1351–1358. John Wiley & Sons Ltd on behalf of the British Association of Dermatologists.

A dermatoscope can also be used in the assessment of nail fold capillaries in connective tissue diseases (e.g. dermatomyositis).

Skin swabs (bacterial/viral)

In a suspected bacterial infection skin swabs for bacteriology should be sent to confirm the organism and provide antibiotic sensitivities to guide antibiotic selection.

Detection of viral skin infection, for example herpes simplex, requires a specific viral swab for viral culture. Increasingly polymerase chain reaction (PCR) amplification of viral DNA/RNA can provide a diagnosis within hours.

Mycological sample collection

Skin. Scraping samples of surface scale from an active margin are taken with a disposable scalpel blade or banana-shaped scalpel. The scrapings should be transported in folded paper, which keeps the specimen dry, thus preventing overgrowth of bacterial contaminants.

Hairs. If tinea capitis is suspected, the hairs should be plucked with the roots intact; cut hairs are unsuitable. Brush samples from the scalp are excellent for culture, but with this technique microscopy is not possible.

Table 1.5 Distribution patterns of cutaneous lesions (adapted from Nast et al. 2016)

Term	Definition	Example
Acral	Lesions involving distal extremities (e.g. ears, nose, fingers and toes)	Acrocyanosis
Asymmetrical	Distribution pattern which lacks symmetry along an axis (e.g. the midline)	Lichen striatus
Blaschkoid; along Blaschko lines	Lesions occurring on embryonic growth lines (Blaschko lines)	Incontinentia pigmenti
Dermatomal (zosteriform)	Lesions confined to one or more dermatome (a segment of skin innervated by a single spinal nerve)	Shingles (herpes zoster)
Disseminated	Lesions distributed randomly over most of the body surface area	Viral exanthem
Exposed skin	Areas exposed to external agents (e.g. airborne allergens, irritants, sunlight)	Airborne allergic contact dermatitis
Extensor sites	Areas overlying muscles and tendons involved in extension (e.g. dorsal forearm, elbow, posterior upper arm)	Psoriasis
Flexural sites	Areas overlying muscle and tendons involved in flexion of joints (e.g. antecubital fossa)	Atopic dermatitis
Follicular	Lesions located within or around hair follicles	Keratosis pilaris
Generalised/ widespread	Distributed over most of the body surface area (see above)	Viral exanthem
Intertriginous	Present in major body folds (axillae, submammary folds, inguinal creases, natal cleft)	Flexural psoriasis
Kobnerised (displaying Kobner phenomenon)	Lesions arranged in a distribution which reflects physical stimuli (e.g. scratching, sunburn)	Lichen planus
Palmo-plantar	Involving palmar and plantar skin	Palmo-plantar pustulosis
Periorificial (e.g. perioral, periorbital)	Involving the skin around orifices	Peri-oral dermatitis
Seborrhoeic	Involving areas with the highest density of sebaceous glands (e.g. scalp, face, upper trunk)	Seborrhoeic dermatitis
Sporotrichoid (Figure 3d)	Lesions occurring along lymphatic vessels, usually of arm or leg	*Mycobacterium marinum* infection
Symmetrical	Lesions occurring with symmetry along an axis, commonly the midline	Psoriasis

Source: Adapted from A. Nast et al. The 2016 International League of Dermatological Societies' revised glossary for the description of cutaneous lesions. British Journal of Dermatology, 2016, 174, pp. 1351–1358. John Wiley & Sons Ltd on behalf of the British Association of Dermatologists.

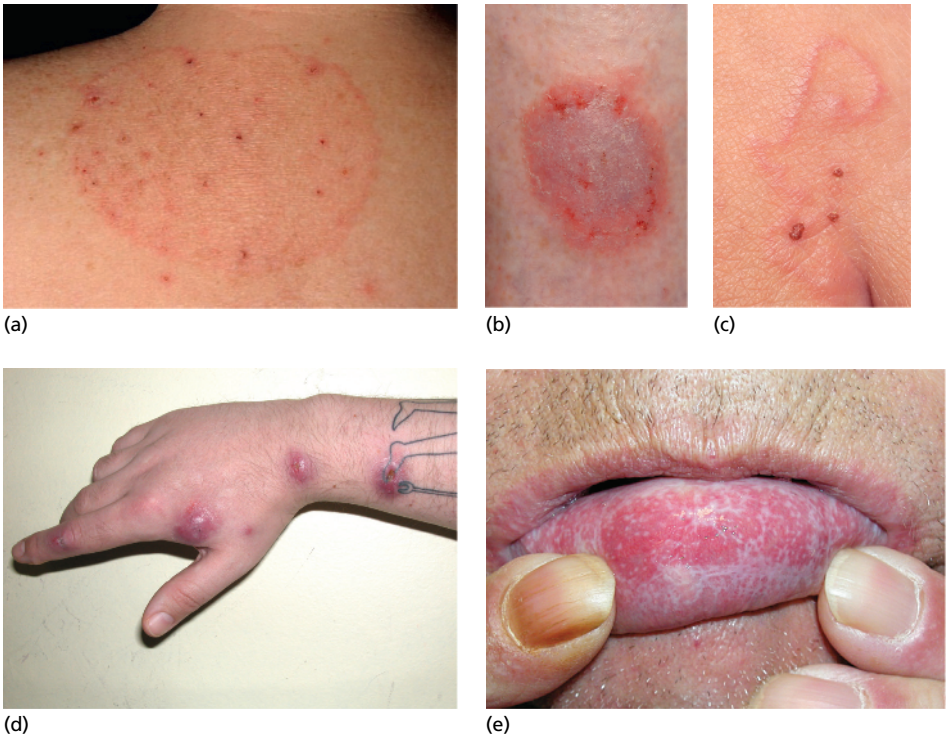

Figure 1.3 Shapes and distribution patterns of skin lesions: (a) annular: tinea cruris; (b) discoid (round): nummular eczema; (c) serpiginous: cutaneous larva migrans; (d) sporotrichoid: Mycobacterium marinum infection; (e) reticulate: lichen planus on the lower lip. (Source: (a), (b) and (c) reproduced with permission of Cardiff and Vale University Health Board.)

Nails. Isolation of the pathogen from nail material is more difficult than in other samples. The full thickness of the nail should be sampled. Debris from under the nail is a fruitful source of material.

Wood's light

This is a source of UV light from which visible light has been excluded by a Wood's (nickel oxide) filter. Variations in epidermal pigmentation are more apparent under Wood's light than under visible light, whereas variations in dermal pigment are less apparent. For example, Wood's light accentuates the epidermal depigmentation of vitiligo, whereas the pallor from localised dermal vasoconstriction in naevus anaemicus disappears under Wood's lamp. Some organisms produce chemicals that fluoresce under Wood's lamp, including *Corynebacterium minutissimum*, the bacterium responsible for erythrasma (Figure 1.4). Wood's light examination is a useful tool in the diagnosis of superficial mycoses, particularly infections due to *Microsporum* species which fluoresce green (Table 1.6).

Specific investigations

Biopsy

A biopsy of lesional skin provides essential information on the dermatopathology of almost all skin disorders. Sections from a paraffin-embedded biopsy specimen are usually stained with haematoxylin and eosin (H&E) for standard histopathological reporting. Special stains can be used to detect the presence of microorganisms (e.g. dermatophytes), the distribution of particular components of the skin (e.g. elastin) and the deposition of pathological substances (e.g. amyloid). Antibody deposition in the skin in immunobullous diseases is assessed

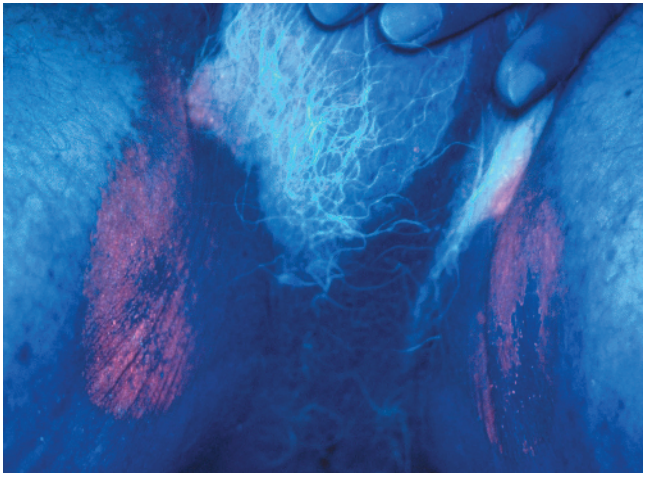

Figure 1.4 Wood's light illumination of erythrasma of the groins. The fluorescence in erythrasma is coral pink.

Table 1.6 Colour under Wood's light linked to clinical examples (adapted from Nast et al. 2016)

Colour under Wood's light	Clinical example(s)
Blue-green to yellow-green	Tinea capitis due to *Microsporum* spp.
Coral pink	Erythrasma
Red	Urine in some forms of porphyria
White	Well-developed lesions of vitiligo
Yellow to yellow-green	Pityriasis (tinea) versicolor

Source: Adapted from A. Nast et al. The 2016 International League of Dermatological Societies' revised glossary for the description of cutaneous lesions. British Journal of Dermatology, 2016, 174, pp. 1351–1358. John Wiley & Sons Ltd on behalf of the British Association of Dermatologists.

by direct immunofluorescence. Skin biopsies are processed specifically for this purpose; the immunofluorescence laboratory technique is performed on frozen sections.

Several different types of biopsy can be performed under local anaesthetic. Punch biopsies provide a small full thickness sample of skin, shave biopsies provide information on superficial skin layers and incisional biopsies may be used to sample a full-thickness section of a larger skin lesion or rash.

Patch tests

Patch tests are typically used to detect contact allergy of the delayed hypersensitivity type. Multiple chemicals are applied to the patient's back to assess for an eczematous reaction. Patch tests are usually read at 2 days and 4 days (see Chapter 69). A patch test technique can be used to detect contact urticaria when the results are read at 15–30 min.

Prick tests

Prick testing investigates immediate type I hypersensitivity reactions. A small quantity of the test solution is placed on the skin and a prick is made through it with a sharp needle. The size of the weal and flare is measured after 15 min and compared with an adjacent control solution.