Lec. 3 | Introduction to dermatology

By Dr.Rofaida Refaat Shehata

Primary skin lesions

1. **Macule:** A flat (nonpalpable) skin lesion ≤ 1 cm in size that differs in color from surrounding skin (e.g.freckle)
2. **Patch:** A flat skin lesion >1cm in size that differs in color from surrounding skin (e.g. congenital nevus)
3. **Papule:** A small, palpable skin lesion ≤ 1 cm in diameter (e.g., lichen planus, molluscum contagiosum, neurofibromatosis type 1, acne)
4. **Nodule:** An elevated lesion, > 1 cm in both diameter and depth
5. **Plaque:** Palpable, usually raised lesion > 2 cm (e.g., pigmented BCC, pityriasis rosea, necrobiosis lipoidica, psoriasis)
6. **Vesicle:** Small fluid-containing blister (collection of fluid in the skin) ≤ 1 cm in diameter (e.g., eczema herpeticum, chickenpox, herpes zoster)
7. **Bulla:** Large fluid-containing blister > 1 cm in diameter (e.g., bullous pemphigoid, Stevens-Johnson syndrome)
8. **Wheal:** Well-circumscribed, pruritic, and erythematous papule or plaque with dermal edema and irregular borders (e.g., urticaria). Transient (hours to days)
9. **Pustule:** Vesicle filled with pus (e.g. pustular psoriasis)

Primary skin lesions

Macule

Patch

Papule

Nodule

Pustule

Vesicle

Bulla

Wheal

Plaque

Secondary skin lesions

1. **Scale**
   - Thickened stratum corneum
   - Scales are flaky, dry and usually whitish.
   - E.g., ichthyosis vulgaris, squamous cell carcinoma, eczema, psoriasis
2. **Crust:** Dried exudates such as pus or blood, E.g., atopic dermatitis, nonbullous impetigo
3. **Fissure:** Linear crack through the epidermis that extends into the dermis
4. **Ulcer:** Rounded or irregularly shaped deeper lesions that result from loss of the epidermis and some portion of the dermis.
5. **Erosion:** Loss of all or portions of the epidermis
6. **Excoriation (scratch marks):** Abrasion produced by mechanical force, usually involving the **epidermis** (but sometimes reaching the outer layer of the **dermis**)
7. **Skin atrophy:** Thinning of skin without inflammation
8. **Scar:**
   - Composed of new connective tissue that has replaced lost substance
   - An overgrowth of scar tissue manifests as keloid (thickened, raised tissue that grows beyond the borders of the scar and shows no regression).

Secondary skin lesions

Scale

Crust

Fissure

Ulcer

Erosion

Excoriation (scratch marks)

Skin atrophy

Scar

Dermatopathology

- **Acantholysis:** Separation of epidermal cells due to dissolution of intercellular bridges (e.g., desmosomes). E.g., Pemphigus vulgaris
- **Acanthosis:** Epidermal hyperplasia of the stratum spinosum. E.g., Acanthosis nigricans, Psoriasis
- **Hypergranulosis :** Thickening of the stratum granulosum, E.g., Lichen planus
- **Hyperkeratosis:** Thickening of the stratum corneum. E.g., Psoriasis, Calluses
- **Parakeratosis:** Retention of nuclei in the stratum corneum. E.g., Psoriasis
- **Spongiosis:** Intraepidermal and intercellular edema, E.g., Eczematous dermatitis
- **Dyskeratosis:** Premature keratinization of the stratum granulosum

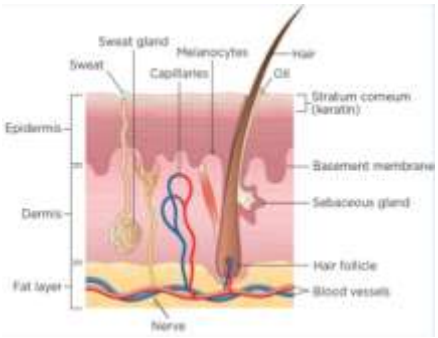
Lec. 3B | Anatomy of skin

By Dr. Eman Fathy Ahmed

Introduction

- The skin is the largest organ of the body, covering an area of approximately 2 m^2.
- **It is composed of**
  1. The cutis (including the dermis and epidermis),
  2. Subcutaneous tissue
  3. And skin appendages.

Structure of the skin



- **The epidermis** is the outermost layer of the skin and is mainly composed of keratinocytes.
- **The dermis** is located underneath the epidermis and is mainly composed of elastic fibers, type I collagen, and connective tissue. It is formed by the papillary dermis and the reticular dermis.
- **The subcutaneous tissue** is the innermost layer of the skin and is mainly composed of fat and connective tissue.
- **Skin appendages** include hair, nails and glands.

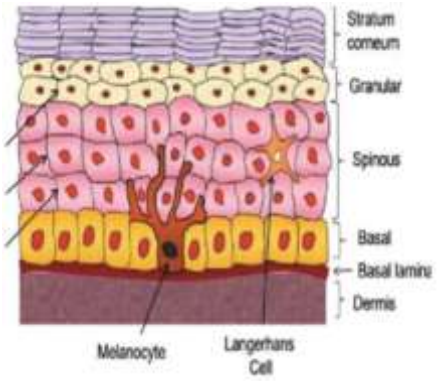
Epidermis

- The outermost and nonvascularized layer of the skin.
- Derived from ectoderm.
- Primarily composed of keratinocytes, which constantly regenerate approximately every 30 days.
- **There are 5 layers of the epidermis, which are categorized as follows (from superficial to deep):**
  1. **Stratum corneum:** outer layer of the epidermis.
  2. **Stratum lucidum:** thin, translucent layer.
  3. **Stratum granulosum:** also called the granular layer.
  4. **Stratum spinosum:** Composed of actively dividing keratinocytes; with spinous-like projections (prickle cells).
  5. **Stratum basale** (also called the basal cell layer of the epidermis): stem cells of the epidermis, melanocytes and merkel cells are also located in this layer.

➤ **Cells of the epidermis:**

The epidermis is mainly composed of four different types of cells.

1. **Keratinocytes:**
   - — Principal cells of the epidermis.
   - — Located throughout the whole epidermis.
2. **Melanocytes:**
   - — Melanin-producing cells derived from neural crest cells.
   - — Located in stratum basale of the skin.
3. **Langerhans cells:**
   - — Macrophages of the skin; a type of dendritic cell.
   - — Located in stratum spinosum.
4. **Merkel cells:** Mechanoreceptors mainly located in the stratum basale.



Layers and cells of epidermis

Dermal epidermal junction

➤ Basement membrane which anchors the epidermis to the dermis.

➤ **Consists of two layers:**

1. **Lamina lucida** (superficial)
2. **Lamina densa** (deeper)

Dermis

➤ Dermis is derived from mesoderm, contains blood vessels and provides structural integrity to the skin.

➤ **It consists of two layers;**

1. **Papillary dermis:**
   - — Consists of fine, loosely arranged collagen fibers.
   - — Supplies the epidermis with nutrients.
   - — Plays an important role in temperature regulation.
2. **Reticular dermis:** Consists of thick, densely packed fibers (e.g., reticular, elastic, and collagenous) that provide structure and support to the skin and its components

Subcutis

➤ (Also called hypodermis)

➤ Consists mainly of subcutaneous fat that protects from cold and trauma.

➤ Contains superficial veins and free nerve endings.

Skin appendages

Skin appendages include hair, nails and glands (e.g., sweat glands and sebaceous glands).

Hair follicle anatomy and growth cycle

Definition: invaginations of the epidermis into the deep dermis, forming a cavity where the hair grows and develops.

Hair follicle anatomy

Composition:

1. **Hair:**
   - A skin appendage that grows from follicles in the dermis.
   - Contains medulla, cortex, and cuticle.
2. **Hair shaft:**
   - Extends above the epidermis.
   - Connects to the hair root in the deep dermis.
3. **Hair bulb:** Root of the hair follicle; located deep in the dermal papilla.
4. **Arrector pili muscle:** Obliquely directed smooth muscle fibers that attach to the dermal sheath surrounding hair follicles.

Types of hair follicles:

- **Vellus hair follicle:**
  - Found throughout the body.
  - During puberty, vellus hairs in the axillae & the genital area become terminal hairs.
- **Terminal hair follicle:** Found on the scalp, eyebrows, and eyelashes.

Hair growth cycle

There are 3 phases of hair growth:

- **Anagen phase:** phase of active growth.
- **Telogen phase:** resting phase.
- **Catagen phase:** phase of follicular regression.

Sweat gland anatomy and types

- Composed of a secretory unit surrounded by myoepithelial cells.
- **Two types of sweat glands** (eccrine and apocrine sweat glands).

Eccrine sweat glands:

- Excretory ducts open into sweat pores.
- Located deep in the dermis and hypodermis in most areas of the body.
- Function in thermoregulation.

Apocrine sweat glands:

- Excretory ducts open into hair follicles.
- Mostly located in axilla, perineum, areola of the nipple and external ear.
- No role in thermoregulation.

Functions of the skin

- **Barrier and protection** against the external environment.
- **Thermoregulation** (e.g., perspiration, regulation of blood circulation).
- **Sensory function:** sensations of pressure, vibration, touch, pain, and temperature.
- **Hormone synthesis** of vitamin D.
- **Melanin synthesis:** provides protection against ultraviolet (UV) radiation and determines the color of the skin and iris.

Lec. 3C | Sweat Gland Disorders

By Dr. Marwa Mohammad Mekkawy

Sweat gland disorders include:

1. Miliaria
2. Hyperhidrosis

Miliaria

Definition: Transient, papular exanthem following exposure to heat

Etiology: Blockage of the eccrine sweat ducts in hot and/or humid environment

Clinical features and types of miliaria:

➤ **Localization:** Mainly on the trunk, neck, and intertriginous areas.

Clinical features and types of miliaria			
	Miliaria crystallina	**Miliaria rubra**	**Miliaria profunda**
Epidemiology	Very common in **neonates**	**Most common type**	Usually seen in adult men in tropical climates, who have had **repeated episodes of miliaria rubra**
Level of sweat duct blockage	Superficial blockage at the **stratum corneum layer**	Blockage within the **subcorneal epidermis**	Deep blockage at the **dermoepidermal junction**
Clinical features	• Clear 1–2 mm • Vesicles with **no erythema**	• **Erythematous, minute papules,** may become inflamed and pus-filled (miliaria pustulosa) • **Itching or stinging** pain, exacerbated by sweating	• **Firm, larger**, erythematous or flesh-colored papules. • **Reduced sweating** from the blocked duct

Miliaria Profunda

Miliaria rubra

Miliaria pustulosa

Miliaria crystallina.
Note the water-drop appearance of the lesions.

Treatment

- **General measures to reduce sweating:** wearing light, breathable fabrics, keeping the patient in a cool environment and removing occlusive bandages, etc.
- Topical steroids (hydrocortisone, triamcinolone), topical antibiotics for pustular eruptions (clindamycin, erythromycin), and soothing local applications (calamine lotion).

Hyperhidrosis

Definition: A condition of localized or generalized excessive sweating

Epidemiology: It is estimated to affect ~ 5% in the US

Etiology

- **Primary focal hyperhidrosis.**
- **Secondary hyperhidrosis** (e.g., due to hyperthyroidism, malignancy, obesity, or adverse effects of medication).

Clinical features and types

Clinical features

Excessive sweating that interferes with activities of daily living, frequent skin infections (e.g., tinea pedis)

Clinical types

1. Primary focal hyperhidrosis	2. Secondary hyperhidrosis
• Usually localized (e.g., underarms, forehead) • Both sides of the body are affected • No sweating during sleep; sweating begins immediately after waking up	• Generalized • May occur during sleep

Palmar hyperhidrosis

Axillary hyperhidrosis

Plantar hyperhidrosis

Diagnosis: Clinical diagnosis and sweat test

Treatment

- Antiperspirants e.g. topical aluminium chloride (over-the-counter or prescription)
- Iontophoresis
- Anticholinergics
- Botulinum toxin A injections
- Surgery (surgical removal of sweat glands or sympathectomy)