

**Hole's Human
Anatomy and Physiology**
Tenth Edition
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Chapter 6

Skin and the Integumentary System

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Introduction

1. Organs are body structures composed of two or more different tissues.
2. integumentary system.
 - A. an outer protective layer

Integumentary System

1. skin and
2. epidermal derivatives

Layers of Skin

The skin consists of two layers

1. epidermis
2. dermis,

subcutaneous layer

(hypodermis), not a part of the skin.

Homeostatic Skin Functions

1. Protection:

- A. Physical barrier
 - a.
 - b.
 - c.
- B. Chemical barrier
 - a.
 - b.
- C. Biological barrier
 - a.

Skin Functions

2. Excretion (minimal)
 - A.
3. Regulation of body temperature
4. Cutaneous Sensation:
 - A.
 - B.

Skin Functions

5. Vitamin D Synthesis:

A.

B.

6. Blood Reservoir:

A.

B.

Epidermis

1. stratified squamous epithelium
2. lacks blood vessels.
3. nourished by dermal blood vessels.
4. rests on basement membrane

Stratified Squamous Epithelial Tissue

- 1.
- 2.
- 3.
- 4.
- 5.

Layers of Epidermis

determined by the extent of keratinization

1. Stratum basale:
2. Stratum spinosum:
3. Stratum granulosum:
4. Stratum lucidum:
5. Stratum corneum:

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Skin Color

genetic, environmental, and
physiological factors.

Melanin

1. Melanocytes
2. Melanin
3. Melanin absorbs ultraviolet

Skin Color

1. Genetic differences
 - A. melanin and size of melanin granules
 - B. same number of melanocytes
 - C. albinos

Skin Color

1. Environmental Factors
 - A. ultraviolet rays
 - B. X rays or sun lamps

Skin Color

1. Physiological factors
 - A. Circulation within dermal blood vessels
 - a. dilation
 - b. constriction
 - B. Carotene
 - C. Jaundice

Dermis

1. binds epidermis to underlying tissues.
2. 1-2 mm thick
3. Epidermal ridges and dermal papillae
4. connective tissue with collagen and elastic fibers within a gel-like ground substance.

Dermis

1. blood vessels carry nutrients and help regulate temperature.

Dermis

1. Smooth muscles associated with follicles and glands.
2. Motor and sensory nerves and sensory receptors.
 - A. Meissner's corpuscles
 - B. Pacinian corpuscles
3. accessory organs

Subcutaneous Layer

1. insulation and protection
2. loose connective tissue and adipose tissue.
3. binds the skin to underlying organs and contains the blood vessels
- 4.

Accessory Organs of the Skin

1. Hair Follicles
 - A. found in nearly all regions of the skin.
 - B. Hair develops from epidermal cells
 - C. cells are pushed outward, become keratinized, and die forming hair shaft.

Hair Follicles

- D. arrector pili muscle
- E. Hair color is determined by genetics;

Accessory Organs of the Skin

1. Nails

- A. protective coverings
- B. nail plate over the epithelium of nail bed
- C. Lunula
- D. Older ones are pushed outward and become keratinized

Accessory Organs of the Skin

1. Sebaceous Glands

- A. associated with hair follicles
- B. secrete sebum
- C. absent on palms and soles

Accessory Organs of the Skin

1. Sweat Glands

- A. Eccrine
- B. Apocrine
- C. ceruminous glands
- D. Mammary glands

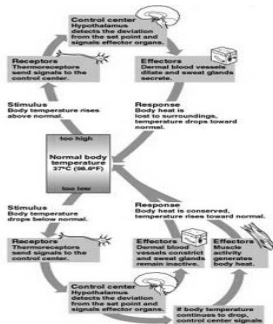
Regulation of Body Temperature

1. maintaining metabolic reactions.
2. skin
3. hypothalamus
4. muscles produce heat.

Regulation of Body Temperature

1. radiation.
2. vasodilation and sweating.
3. vasoconstriction, inactivating sweat glands, and shivering.

Regulation of Body Temperature



Problems in Temperature Regulation

1. Hyperthermia
 - A. high body temperature
 - B. inadequate body cooling
2. Hypothermia
 - A. low body temperature
 - B. cold exposure

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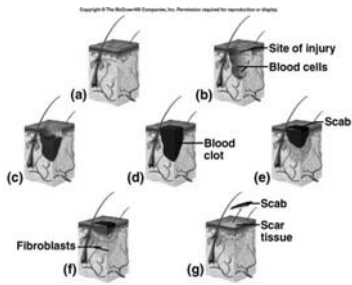
Healing of Wounds and Burns

1. Inflammation is the body's normal response to injury.
2. Superficial cuts are filled in by reproducing epithelial cells.

Healing of Wounds and Burns

1. Deeper cuts
 - A. clots, scabs, fibroblasts,
 - B. Blood vessels extend into the area
2. Large wounds leave scars

Healing of Cuts



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Healing of Burns

1. First degree burn
 - A. Superficial partial-thickness
 - B. Epidermis
 - C. Reddening
 - D. Mild pain
 - E. Common in sunburn
 - F. Heals in a few days-2 weeks

Healing of Burns

2. Second degree burn
 - A. Deep partial-thickness
 - B. Reddening and blistering
 - C. Moderate pain
 - D. hot objects
 - E. Heals in 2-6 weeks without scars unless infected

Healing of Burns

- 3. Third degree burn
 - A. full-thickness
 - B. destroy the epidermis, dermis, and accessory skin organs
 - C. Dry, leathery tissue with red or black color
 - D. Severe pain
 - E. prolonged heat or chemical contact

Healing of Burns

- 3. Third degree burn
 - A. Healing rarely occurs due
 - a. Autograft
 - b. Homograft
 - c. Skin substitutes
 - B. extensive scars

Rule of Nines

- 1. subdivision of skin surface into regions encompassing 9% of total surface area
- 2. Body parts are assigned a value of nine or multiple of nine
 - A.
 - B. Method for rapid calculation of burns & treatment

Rule of Nines

1. Estimates severity of burns
2. Burns considered critical if:
 - A. Over 25% of the body has second-degree burns
 - B. Over 10% of the body has third-degree burns
 - C. There are third-degree burns on face, hands, or feet

Skin Cancers

1. three types
 - A. Basal Cell Carcinoma
 - B. Squamous cell carcinoma
 - C. Melanoma

Basal Cell Carcinoma

Squamous Cell Carcinoma

Melanoma

ABC's of Melanoma

1. Asymmetry
2. Border
3. Color
4. Diameter
5. Elevation

Developmental Aspects of the Integument: Old Age

- 1. Epidermal replacement of cells slows
- 2. Skin becomes dry and itchy
- 3. Subcutaneous fat layer diminishes
- 4. Decreased elasticity and loss of subcutaneous tissue
- 5. Decreased numbers of melanocytes and Langerhans' cells

Clinical Application

- 1. Acne Vulgaris
- 2. most common skin disorder
- 3. sebum and epithelial cells clog gland ducts
- 4. produces whiteheads and blackheads
- 5. anaerobic bacteria trigger inflammation
- 6. largely hormonally induced
- 7. androgens stimulate sebum production
- 8. treatments include antibiotics, topical creams, birth control pills
