

## Chapter 6 - Integumentary System

### 6.1 Introduction

- A. Skin is the largest organ in the body by weight.

### 6.2 Skin and Its Tissues (Fig. 6.1)

- A. The skin is a large organ responsible for maintaining homeostasis through temperature regulation, protection of underlying tissues, retardation of water loss, housing sensory receptors, synthesizing certain chemicals, and excreting wastes.
- B. The skin consists of two main layers: an outer epidermis and a dermis. The skin is connected to underlying tissue by the subcutaneous layer (hypodermis).
- C. Epidermis (Figs. 6.1a-6.3)
  - 1. The epidermis is made up of stratified squamous epithelium and lacks blood vessels.
  - 2. The layer of reproducing cells (the stratum basale), which lies at the base of the epidermis, is well nourished by dermal blood vessels.
  - 3. Cells are pushed outward as new cells are formed, and become keratinized as they die.
  - 4. Four or five layers may be seen: stratum basale, stratum spinosum, stratum granulosum, and stratum corneum are always present. The stratum lucidum is found in the thicker palms and soles.
  - 5. The epidermis is important because it protects against water loss, mechanical injury, chemicals, and microorganisms.
  - 6. Melanocytes, which lie deep in the epidermis and underlying dermis, produce a pigment called melanin that protects deeper cells from the sun's ultraviolet rays.
  - 7. Melanocytes pass melanin to nearby cells through cytotrine secretion.
  - 8. Skin Color
    - a. Skin color results from a combination of genetic, environmental, and physiological factors.
    - b. Genetic differences in skin color result from differing amounts of melanin and in the size of melanin granules.
    - c. Exposure to sunlight causes darkening of skin as melanin production increases.
    - d. Circulation within dermal blood vessels affects skin color.
- D. Dermis (Fig. 6.1a)
  - 1. The dermis binds the epidermis to underlying tissues. Epidermal ridges and dermal papillae cause the border to be uneven.
  - 2. The dermis is primarily composed of connective tissue with collagen and elastic fibers within a gel-like ground substance.
  - 3. Dermal blood vessels carry nutrients to upper layers of skin and help to regulate temperature.
  - 4. The dermis also contains nerve fibers, sensory fibers, hair follicles, sebaceous glands, and sweat glands.

### 6.3 Accessory Structures of the Skin

- A. Nails (Fig. 6.4)
  - 1. Nails are protective coverings over the ends of fingers and toes.
  - 2. Nails consist of stratified squamous epithelial cells overlying the nail bed, with the lunula as the most actively growing region of the nail root.
  - 3. As new cells are produced, older ones are pushed outward and become keratinized.
- B. Hair Follicles (Figs. 6.1,6.5,6.6)
  - 1. Hair can be found in nearly all regions of the skin.
  - 2. Individual hairs develop from cells at the base of the hair follicle, an invagination of the lower epidermis that dips down into the dermis.

3. As new cells are formed, old cells are pushed outward and become keratinized, and die forming the hair shaft.
  4. A bundle of smooth muscle cells, called the arrector pili muscle, attaches to each hair follicle. These muscles cause goose bumps when cold or frightened.
  5. Hair color is determined by genetics; melanin from melanocytes is responsible for most hair colors, but red hair also contains the pigment trichosiderin.
- C. Sebaceous Glands (Figs. 6.5a, 6.7)
1. Sebaceous glands (holocrine glands) are associated with hair follicles and secrete sebum that waterproofs and moisturizes the hair shafts.
- D. Sweat Glands (Fig 6.5a)
1. Sweat glands (sudoriferous glands) are either eccrine, which respond to body temperature, or apocrine, which respond to body temperature, stress, and sexual arousal.
  2. Modified sweat glands, called eruminous glands, secrete wax in the ear canal.
  3. Mammary glands, another modified type of sweat glands, secrete milk.

#### **6.4 Regulation of Body Temperature**

- A. Proper temperature regulation is vital to maintaining metabolic reactions.
- B. The skin plays a major role in temperature regulation with the hypothalamus controlling it.
- C. Active cells, such as those of the heart and skeletal muscle, produce most of the body's heat.
- D. Heat may be lost to the surroundings from the skin through radiation.
- E. The body responds to excessive heat by dilation of dermal blood vessels and sweating.
- F. The body responds to excessive cooling by constricting dermal blood vessels, inactivating sweat glands, and shivering.

#### **6.5 Healing of Wounds (Table 6.1)**

- A. Inflammation, in which blood vessels dilate and become more permeable, causing tissues to become red and swollen, is the body's normal response to injury.
- B. Superficial cuts are filled in by reproducing epithelial cells.
- C. Deeper cuts are closed off by clots, covered by scabs, and eventually filled in by fibroblasts, making connective tissue. Blood vessels extend into the area, injured tissues are replaced, and the scab falls off.
- D. Large wounds leave scars and healing may be accompanied by the formation of granulations.