Chapter 6
Integumentary System

Introduction

A. Organs are body structures composed of two or more different tissues.
B. The skin and its accessory organs make up the integumentary system.

Skin and Its Tissues

A. The skin is a large organ responsible for maintaining homeostasis through temperature regulation, protection of underlying tissues, prevention of water loss, housing sensory receptors, synthesizing certain chemicals, and excreting wastes.
B. The skin consists of an outer epidermis and a dermis, connected to underlying tissue by the subcutaneous layer (hypodermis).
C. Epidermis
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. The epidermis is important because it protects against water loss, mechanical injury, chemicals, and microorganisms.

5. 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.

6. Melanocytes pass melanin to nearby cells.

D. Skin Color

1. Skin color results from a combination of genetic, environmental, and physiological factors.

2. Genetic differences in skin color result from differing amounts of melanin and in the size of melanin granules.

3. Exposure to sunlight causes darkening of skin as melanin production increases.

4. Circulation within dermal blood vessels affects skin color.
E. **Dermis**
   1. The dermis binds the epidermis to underlying tissues. Epidermal ridges and dermal papillae cause the border to be uneven.
   2. The dermis consists 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.

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**Accessory Structures of the Skin**

A. **Nails**
   1. Nails are protective coverings over the ends of fingers and toes.
B. Hair Follicles

1. Hair can be found in nearly all regions of the skin except palms, soles, lips, nipples, and portions of external genitalia.

2. Each hair develops from cells at the base of a tubelike depression called the hair follicle.

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.

6. The **arrector pili muscle** attaches to each hair follicle.

C. **Sebaceous glands**

1. **Sebaceous glands** are associated with hair follicles and secrete sebum that waterproofs and moisturizes the hair shafts.
D. Sweat Glands
   1. **Sweat glands** respond to body temperature, stress, and sexual arousal. The secretions exit via a surface pore.
   2. Modified sweat glands, called **ceruminous glands**, secrete wax in the ear canal.
   3. **Mammary glands**, another modified type of sweat glands, secrete milk.

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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 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.
Healing of Wounds

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. The blood clot and dried tissue fluids form a scab.

D. If the wound is deep, extensive production of collagen fibers may form an elevation above the normal epidermal surface forming a scar.