

Integumentary, Skeletal, and Muscular Systems

section 1 The Integumentary System

● Before You Read

Your entire body is covered by skin. What are the functions of your skin? On the lines below, list your ideas. After you read this section, add other functions to your list.

● Read to Learn

The Structure of Skin

The integumentary (ihn TEG yuh MEN tuh ree) system is the organ system that covers and protects the body. Skin is the main organ of the integumentary system.

Skin is made up of four types of tissues. (1) Epithelial tissue covers body surfaces. (2) Connective tissue supports and protects. (3) Muscle tissue enables movement. (4) Nerve tissue is the body's communication network. Refer to the figure on the next page as you read about the two main layers of skin: the epidermis and the dermis.

What are the functions of the epidermis?

The outer layer of skin is the epidermis. It consists of a thin layer of epithelial cells. The outer layers of epidermal cells contain keratin. Keratin (KER uh tun) is a protein that waterproofs and protects the cells and tissues underneath. These dead outer cells are shed constantly.

The cells of the inner layer of epidermis continually divide by mitosis to replace the cells that are shed. This inner layer produces a pigment called melanin. Melanin protects deeper cells from the damaging effects of ultraviolet rays of sunlight. The amount of melanin produced determines skin color.

MAIN Idea

Skin is a multilayered organ that covers and protects the body.

What You'll Learn

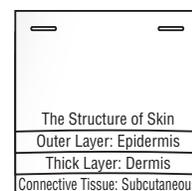
- the functions of the integumentary system
- the events that occur when skin is repaired

Study Coach

Make an Outline Make an outline of the information you learn in this section. Start with the headings. Include the boldface terms.

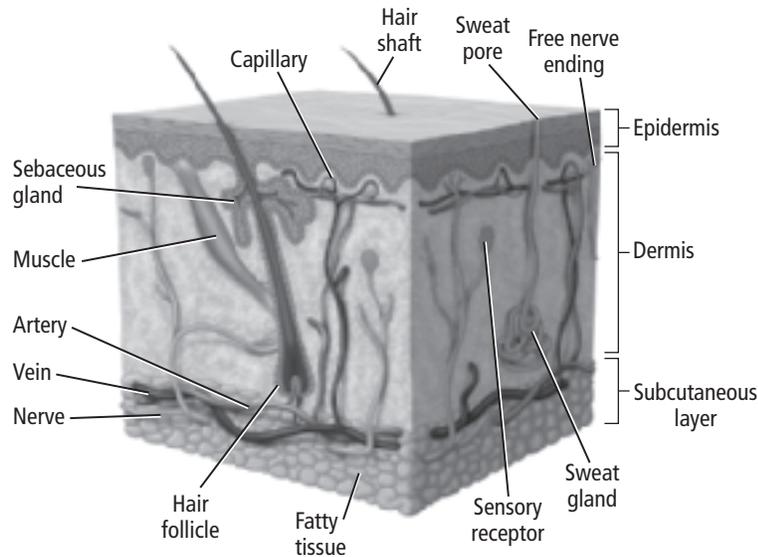
FOLDABLES™

Take Notes Make a layered Foldable, as shown below. As you read, take notes and organize what you learn about the structure and function of skin.



Picture This

1. **Highlight** the names of the structures that are responsible for acne.



What structures are found in the dermis?

Below the epidermis is the thicker second layer of skin called the **dermis**. The dermis is made up of connective tissue. Connective tissue prevents the skin from tearing and enables the skin to return to its normal state after it is stretched. The dermis contains nerve cells, muscle fibers, sweat glands, oil glands, and hair follicles.

Below the dermis is the subcutaneous layer. This is a layer of connective tissue that stores fat and holds heat.

How do hair and nails develop?

Fingernails, toenails, and hair are part of the integumentary system. Both nails and hair contain keratin and develop from epithelial cells. Hair cells grow out of holes in the dermis called **hair follicles**. Cells at the base of a hair follicle divide and push cells away from the follicle. This causes hair to grow. 

Around the hair follicles are **sebaceous glands**. These oil-producing glands lubricate skin and hair. When glands produce too much oil, the follicles can become inflamed and blocked. This can result in a whitehead, a blackhead, or acne—an inflammation of the sebaceous glands.

Fingernails and toenails grow from specialized epithelial cells at their base. The cells at the base divide, and older, dead cells are compacted or pushed out.

Functions of the Integumentary System

Skin serves several important functions. It regulates body temperature, produces vitamin D, protects our bodies, and helps us sense our surroundings.

Reading Check

2. **Define** Which of the following best describes a hair follicle? (Circle your answer.)
 - a. gland
 - b. shaft of hair
 - c. hole

How does the body regulate its temperature?

When you are hot, your body sweats. The evaporation of sweat cools your body. Evaporation transfers heat energy from your body to your surroundings. When you are cold, your muscles contract causing goose bumps. In animals, these contractions cause hair to stand up and trap air to warm the animal. With little hair to keep us warm, humans depend on fat in the subcutaneous layer for warmth.

Why is vitamin D important?

Skin responds to exposure to the Sun's ultraviolet rays by producing vitamin D. Vitamin D helps the body absorb calcium and is essential for proper bone formation. 

How does skin protect and sense?

Unbroken skin keeps microorganisms out of the body. Skin helps maintain body temperature by preventing the loss of too much water. Melanin protects from ultraviolet rays.

Nerves in the skin relay messages about changes in the environment to the brain. The nerves make a person aware of pain, pressure, and changes in temperature.

Damage to the Skin

Skin usually repairs itself. If it did not, the body could be invaded by microbes through breaks in the skin. For minor scrapes, epidermal cells divide and replace the injured cells. Deeper injuries that harm blood vessels result in bleeding. Blood clots form a scab to close the wound. Cells beneath the scab divide and fill the wound, while blood cells help fight infections.

How do the Sun's rays affect the skin?

As people age, their skin becomes less flexible and wrinkles form. Exposure to ultraviolet rays can accelerate this process. Ultraviolet rays can also burn the skin. Burns from any source are classified by severity. First-degree burns only involve epidermal cells. Second-degree burns damage both dermis and epidermis, causing blisters and scars. Third-degree burns damage muscle tissue and nerve cells in both layers, and skin function is lost.

What can put a person at risk for skin cancer?

Exposure to ultraviolet radiation from the Sun or a tanning bed increases the risk of skin cancer. Ultraviolet radiation can damage DNA in skin cells, causing those cells to divide uncontrollably. Clothing and sunscreen of SPF 15+ protect against skin cancer. 

Reading Check

3. Explain Why is vitamin D important to humans?

Reading Check

4. Explain why you should avoid using a tanning bed.
