

The Skin

Reading Preview

Key Concepts

- What are the functions and the structures of skin?
- What habits can help keep your skin healthy?

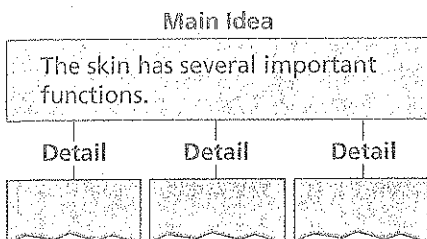
Key Terms

- epidermis • melanin
- dermis • pore • follicle
- cancer



Target Reading Skill

Identifying Main Ideas As you read *The Body's Tough Covering*, write the main idea—the biggest or most important idea—in a graphic organizer like the one below. Then, write five supporting details. The supporting details give examples of the main idea.



Lab zone

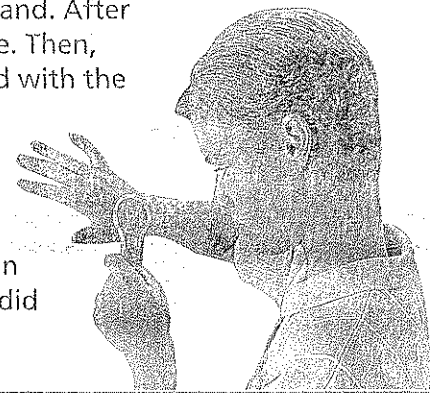
Discover Activity

What Can You Observe About Skin?

1. Using a hand lens, examine the skin on your hand. Look for pores and hairs on both the palm and back of your hand.
2. Place a plastic glove on your hand. After five minutes, remove the glove. Then, examine the skin on your hand with the hand lens.

Think It Over

Inferring Compare your hand before and after wearing the glove. What happened to the skin when you wore the glove? Why did this happen?



Here's a question for you: What's the largest organ in the human body? If your answer is the skin, you are right! If an adult's skin were stretched out flat, it would cover an area larger than 1.5 square meters—about the size of a mattress on a twin bed. You may think of the skin as nothing more than a covering that separates the inside of the body from the outside environment. If so, you'll be surprised to learn about the many important roles that the skin plays.

The Body's Tough Covering

The skin performs several major functions in the body. The skin covers the body and prevents the loss of water. It protects the body from injury and infection. The skin also helps to regulate body temperature, eliminate wastes, gather information about the environment, and produce vitamin D.

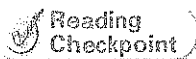
Protecting the Body The skin protects the body by forming a barrier that keeps disease-causing microorganisms and harmful substances outside the body. In addition, the skin helps keep important substances inside the body. Like plastic wrap that keeps food from drying out, the skin prevents the loss of important fluids such as water.

Maintaining Temperature Another function of the skin is to help the body maintain a steady temperature. Many blood vessels run throughout the skin. When you become too warm, these blood vessels enlarge and the amount of blood that flows through them increases. These changes allow heat to move from your body into the outside environment. In addition, sweat glands in the skin respond to excess heat by producing perspiration. As perspiration evaporates from your skin, heat moves into the air.

Eliminating Wastes Perspiration contains dissolved waste materials that come from the breakdown of chemicals during cellular processes. Thus, your skin is also helping to eliminate wastes whenever you perspire. For example, wastes that come from the breakdown of proteins are eliminated in perspiration.

Gathering Information The skin also gathers information about the environment. To understand how the skin does this, place your fingertips on the skin of your arm and press down firmly. Then lightly pinch yourself. You have just tested some of the nerves in your skin. The nerves in skin provide information about such things as pressure, pain, and temperature. Pain messages are important because they warn you that something in your surroundings may have injured you.

Making Vitamin D Lastly, some of the skin cells produce vitamin D in the presence of sunlight. Vitamin D is important for healthy bones because it helps the cells in your digestive system to absorb the calcium in your food. Your skin cells need only a few minutes of sunlight to produce all the vitamin D you need in a day.



Reading
Checkpoint

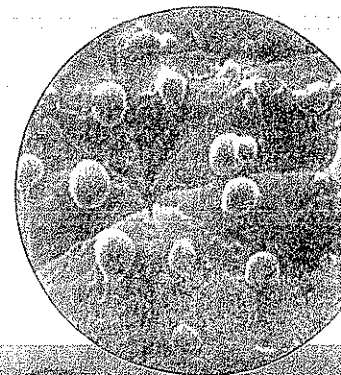
How does your skin help eliminate waste materials from your body?

FIGURE 18

Skin Function

Sweat glands in the skin produce perspiration, which leaves the body through pores. The photo shows beads of sweat on skin.

Relating Cause and Effect How does perspiration help cool your body?



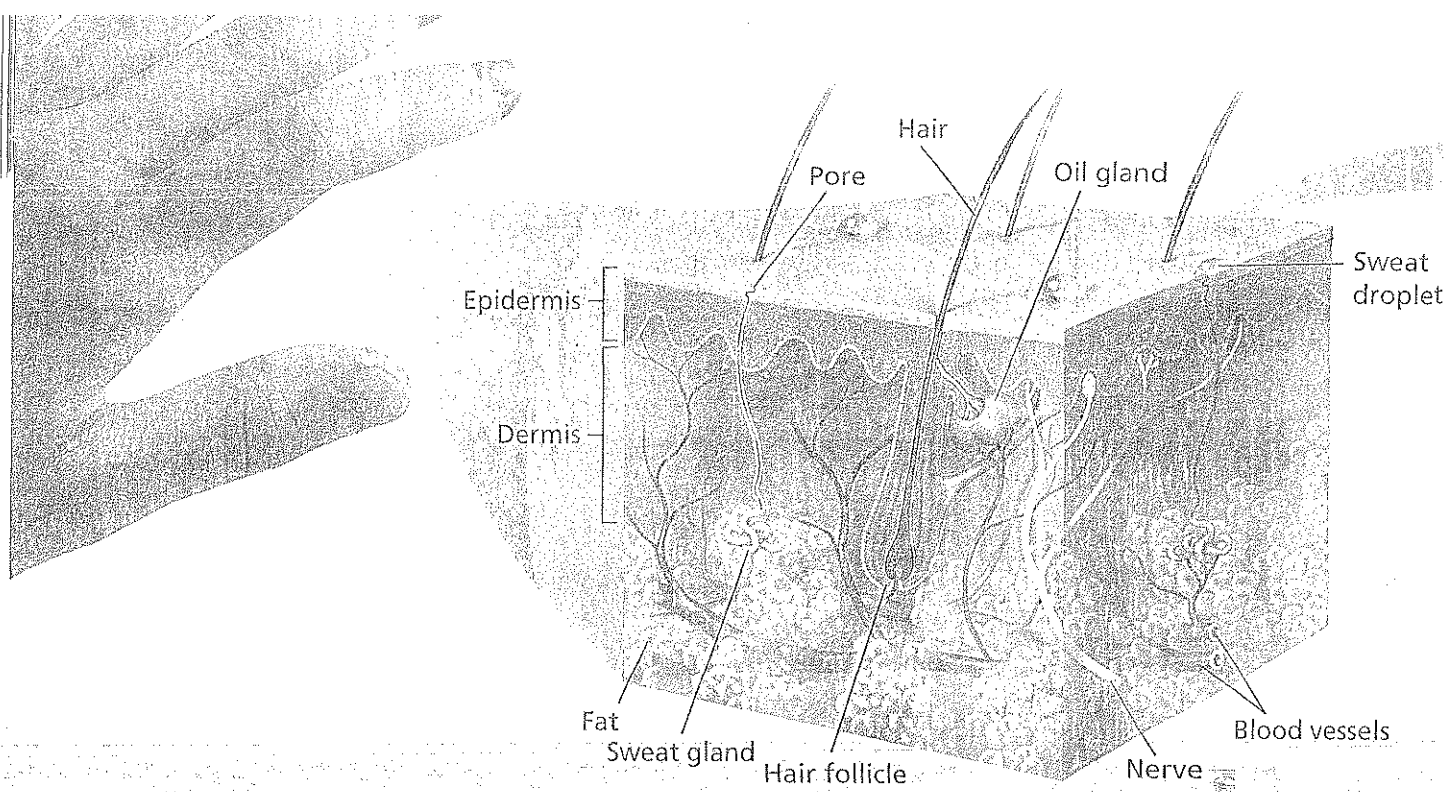


FIGURE 19

Cross Section of Skin Layers

The skin is made of two main layers. The top layer is called the epidermis. The bottom layer is called the dermis.

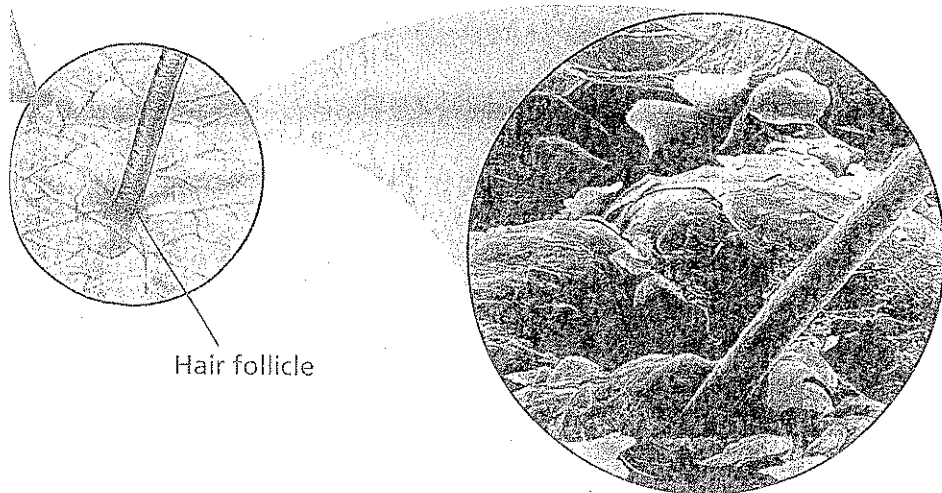
Interpreting Diagrams In which layer of the skin do you find blood vessels?

The Epidermis

The skin is organized into two main layers, the epidermis and the dermis. The epidermis is the outer layer of the skin. In most places, the epidermis is thinner than the dermis. The epidermis does not have nerves or blood vessels. For this reason, you usually don't feel pain from very shallow scratches, and shallow scratches do not bleed.

Epidermis Structure Like all cells, the cells in the epidermis have a life cycle. Each epidermal cell begins life deep in the epidermis, where cells divide to form new cells. The new cells mature and move upward in the epidermis as new cells form beneath them. After about two weeks, the cells die and become part of the epidermal surface layer. Under a microscope, this surface layer of dead cells resembles flat bags laid on top of one another. Cells remain in this layer for about two weeks. Then, they are shed and replaced by the dead cells below.

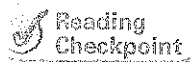
Epidermis Function In some ways, the cells of the epidermis are more valuable to the body dead than alive. Most of the protection provided by the skin is due to the layer of dead cells on the surface. The thick layer of dead cells on your fingertips, for example, protects and cushions your fingertips. Also, the shedding of dead cells carries away bacteria and other substances that settle on the skin. Every time you rub your hands together, you lose thousands of dead skin cells.



Hair follicle

Some cells in the inner layer of the epidermis help to protect the body, too. On your fingers, for example, some cells produce hard fingernails, which protect the fingertips from injury and help you scratch and pick up objects.

Other cells deep in the epidermis produce melanin, a pigment, or colored substance, that gives skin its color. The more melanin in your skin, the darker it is. Exposure to sunlight stimulates the skin to make more melanin. Melanin production helps to protect the skin from burning.



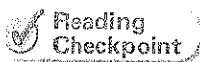
Reading
Checkpoint

What is melanin?

The Dermis

The **dermis** is the inner layer of the skin. Find the dermis in Figure 19. Notice that it is located below the epidermis and above a layer of fat. This fat layer pads the internal organs and helps keep heat in the body.

The dermis contains nerves and blood vessels. The dermis also contains sweat glands, hairs, and oil glands. Sweat glands produce perspiration, which reaches the surface through openings called **pores**. Strands of hair grow within the dermis in structures called **follicles** (FAHL ih kulz). The hair that you see above the skin's surface is made up of dead cells. Oil produced in glands around the hair follicles help to waterproof the hair. In addition, oil that reaches the surface of the skin helps to keep the skin moist.



Reading
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What is the function of pores in the skin?

Lab
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Try This Activity

Sweaty Skin

This activity illustrates one of the skin's most important functions.

1. Put on your safety goggles. Wrap a wet cotton ball around the bulb of one thermometer. Place a second thermometer next to the first one.

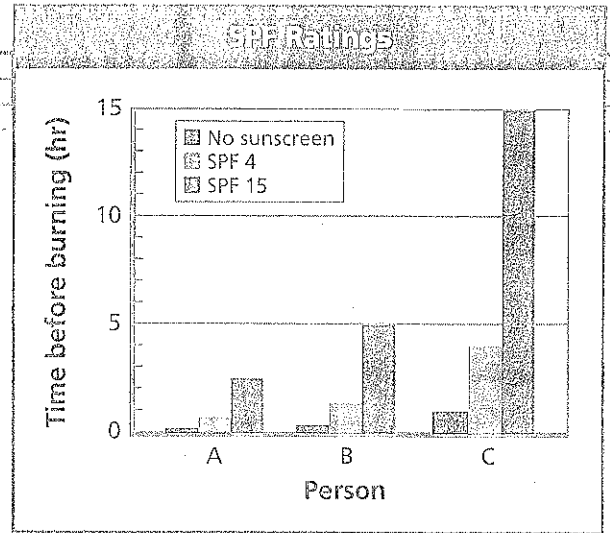


2. After two minutes, record the temperature reading on each thermometer.
3. Using a piece of cardboard, fan both thermometers for several minutes. The cardboard should be at least 10 cm from the thermometers. Record the temperatures.

Measuring Which of the two thermometers had a lower temperature after Step 3? How does this activity relate to the role of skin in regulating body temperature?

SPF Ratings

The graph shows how sunscreens with different sun protection factor (SPF) ratings extend the time three people can stay in the sun without beginning to get a sunburn.



1. **Reading Graphs** What does the height of each bar in the graph represent?

2. **Interpreting Data** How long can Person B safely stay in the sun without sunscreen? With a sunscreen of SPF 4? SPF 15?

3. **Calculating** Which is more effective at preventing sunburn—SPF 4 or SPF 15? How much more effective is it? Show your work.

4. **Predicting** Person A applied a sunscreen with an SPF of 4 at 1:30 in the afternoon. To stay safe in the sun, at what time would he need to apply a second coat of sunscreen?

5. **Drawing Conclusions** What does the number in the SPF rating stand for? (*Hint: Note the length of time each person can stay in the sun without sunscreen and compare this value to the length of time each can stay in the sun using SPF 4. Then, do the same for SPF 15.*)



For: Links on the skin
 Visit: www.SciLinks.org
 Web Code: scn-0415

Caring for Your Skin

Because your skin has so many vital functions, taking care of it is important. Three simple habits can help you keep your skin healthy. Eat a healthful diet. Limit your exposure to the sun. Keep your skin clean and dry.

Healthful Diet Your skin is always active. Eating a well-balanced diet provides the energy and raw materials needed for growth and replacement of hair, nails, and skin cells. In addition to what you eat, a healthful diet also includes drinking plenty of water.

Keeping Skin Clean Good washing habits are particularly important during the teenage years when oil glands are more active. When glands become clogged with oil, the black- and whiteheads of acne can form.

If acne becomes infected by skin bacteria, your doctor may prescribe an antibiotic to help control the infection. When you wash your skin, you help to control oiliness and prevent the growth of bacteria.

Limiting Sun Exposure You can take actions to protect your skin from the harmful effects of the sun. Repeated exposure to sunlight can damage skin cells and cause them to become cancerous. Cancer is a disease in which some body cells divide uncontrollably.

There are many things you can do to protect your skin from damage by the sun. When you are outdoors, always wear a hat, sunglasses, and use a sunscreen on exposed skin. Choose clothing made of tightly woven fabrics for the greatest protection. In addition, avoid exposure to the sun between the hours of 10 A.M. and 2 P.M. That is the general time period when sunlight is the strongest.



What are two things you can do to protect your skin from sun exposure?

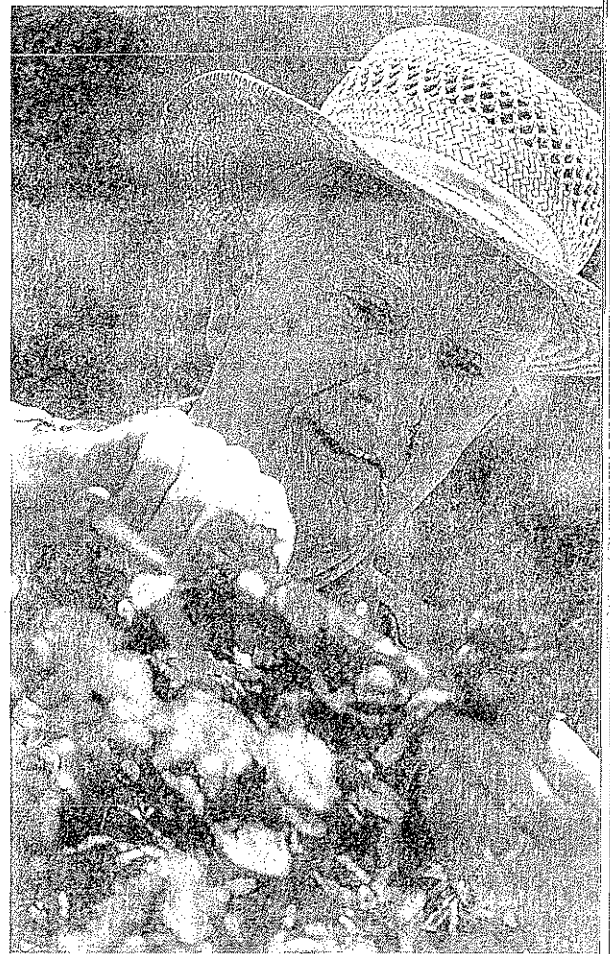


FIGURE 20
Skin Protection

This person is wearing a hat to protect his skin from the sun.
Applying Concepts What other behaviors can provide protection from the sun?

section 5 Assessment

Target Reading Skill Identifying Main Ideas Use your graphic organizer to help you answer Question 1 below.

Reviewing Key Concepts

- Listing** What are three structures found in the dermis?
 - Identifying** What structure in the dermis helps to maintain body temperature?
 - Inferring** What could happen if the pores in your dermis become blocked?
- Identifying** What are three things you can do to keep your skin healthy?
 - Explaining** Why is it important to use sunscreen to protect your skin when outside?
 - Making Judgments** Do you think it is possible to wash your skin too much and damage it as a result? Why or why not?

Lab
zone

At-Home Activity

Protection From the Sun With a family member, look for products in your home that provide protection from the sun. You may also want to visit a store that sells these products. Make a list of the products and place them in categories, such as sunblocks, clothing, eye protectors, and other forms of protection. Explain to your family member why it is important to use such products.