

What Is This Module About?

When you are building a house, what structures do you put up first? After putting up the framework of your house, what's the next thing you do? You will then put up the walls and roof of your house. The framework of the house is built first so your house can stand. But what about the walls and roof? What are they for? Can you imagine a house without walls and a roof? It wouldn't look like a house at all, would it?

The human body is like a house. It needs the supporting framework provided by the skeletal system. Just as important as the walls and the roof to the houses, so is the skin to the human body—to keep its occupants (internal organs) safe and protected from the environment.

This module will teach you all about the *integumentary system*. You will learn all its parts and how they work together as a functioning whole. You will also learn about some injuries and diseases that can harm this system as well as how best to take care of it. This module is made up of three lessons:

Lesson 1 — *The Integumentary System*

Lesson 2 — *The Parts of the Integumentary System and Their Functions*

Lesson 3 — *Common Skin Diseases and Injuries: Prevention and Treatment*



What Will You Learn From This Module?

After studying this module, you should be able to:

- ◆ state how the integumentary system works;
- ◆ identify the parts of the integumentary system and their functions;
- ◆ identify some injuries and diseases that can affect the integumentary system; and
- ◆ cite ways to take care of the integumentary system.



Let's See What You Already Know

Before you start studying this module, take this simple test first to find out what you already know about the topic.

Match the terms in column A with their definitions in column B. Write the letters of the correct answers only.

A	B
_____ 1. Integumentary system	a. The outer surface of the skin—derived from the Greek words epi meaning “over” and dermis meaning “skin”
_____ 2. Epidermis	b. An infectious disease of the skin, mucous membranes and nerves mainly occurring in tropical regions, caused by a bacterium formerly often leading to paralysis, disfigurement and deformity but now curable with antibacterial drugs
_____ 3. Dermis	c. Any of the tiny glands in the dermis of the skin that protect the skin by secretion of sebum
_____ 4. Sebaceous gland	d. A fungal infection of the foot caused by a type of ringworm and usually characterized by itching lesions on the skin between the toes
_____ 5. Subcutaneous tissue	e. The pit surrounding the root of a hair
_____ 6. Hair follicle	f. A skin disorder common in adolescence caused by overactivity of the sebaceous glands especially on the face, chest and back
_____ 7. Sweat gland	g. The system that provides protection, sensory perception, temperature regulation and a means of excreting wastes from the human body
_____ 8. Acne	h. The thick lower layer of the skin that lies beneath the epidermis containing blood capillaries, nerve endings, hair follicles, sweat glands, lymph vessels and some muscle fibers
_____ 9. Athlete's foot	i. Any of the tissues under the skin
_____ 10. Leprosy	j. Any of the minute curled tubes of the skin's epidermis growing down into the dermis which actively secrete sweat

Well, how was it? Do you think you fared well? Compare your answers with those found in the *Answer Key* on page 35 to find out.

If all your answers are correct, very good! This shows that you already know much about the topics in this module. You may still study the module to review what you already know. Who knows, you might learn a few more new things as well.

If you got a low score, don't feel bad. This means that this module is for you. It will help you understand some important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

You may go now to the next page to begin Lesson 1.

The Integumentary System

Animals need an outer covering over their bodies to enable them to cope with the varying temperatures in their environment. Polar bears, for example, have thick fur to keep their bodies warm in the very cold regions where they live. Animals who live in warmer regions may also have fur though not as thick as a polar bear's. Some are covered with scales or shells. Birds have feathers while some mammals have thick skins called hides. These keep them safe from predators. Just like the other animals, human beings also have skin which protects them from the elements. But the skin does more than that. It is a living, active organ that does many wonderful things to keep the body not only safe but also functioning well.

This lesson will tell you all about the integumentary system which the skin is part of. Are you ready? Why don't you start by doing the following activity?



Let's Try This

Get ten pictures of different animals. You may include animals not found in our country. Study the pictures and note the outer covering of each animal. Write down your observations in the table below.

Animal	Outer Covering	Possible Explanation Why They Have This Covering

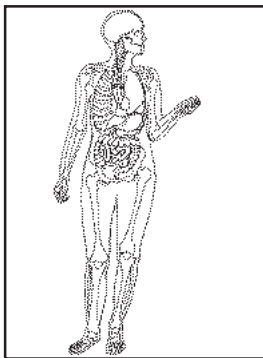


Let's Learn

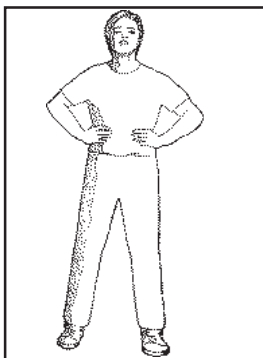
The integumentary system is made up of the skin and its glands and outgrowths. It provides protection, sensory perception, temperature regulation and a means of excreting wastes from the human body.

The skin is the largest organ in the body making up 12 to 15 percent of body weight and a surface area of one to two meters.

The skin and its appendages (hair, nails, sebaceous and sweat glands) make up a very complex set of organs that accomplish several functions for the human body which include:

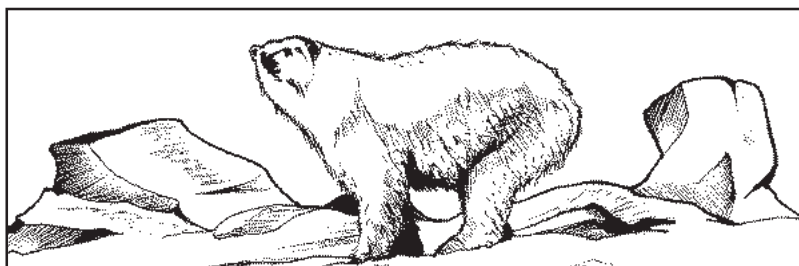


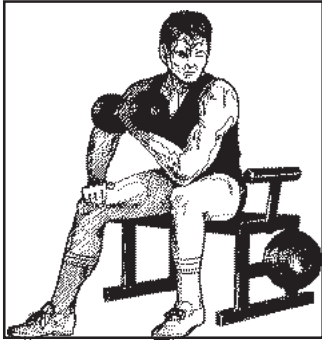
1. providing protection for the internal organs from the outside environment;



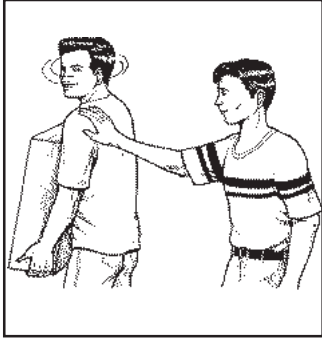
2. providing protection from dehydration or the loss of internal fluids;

3. maintaining homeostasis or the tendency of an animal or organism to maintain a constant internal environment regardless of varying external conditions;

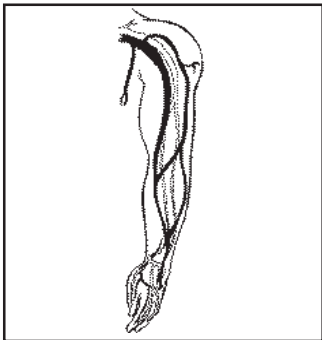




4. excreting some waste products via the sebaceous and sweat glands;



5. maintaining the sites for reception of external cutaneous sensations;



6. serving as a blood reservoir; and



7. doing some metabolic functions.

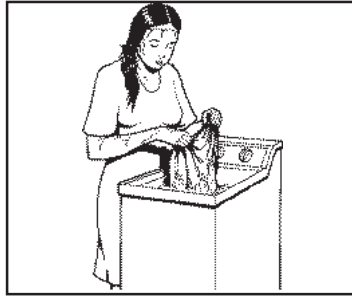


Let's See What You Have Learned

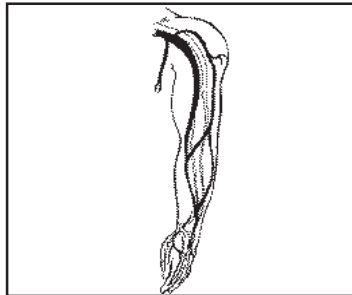
Match the pictures in Column A with their corresponding descriptions of how the integumentary system works for the body in Column B. Write the letters of the correct answers in the blanks before the numbers.

A

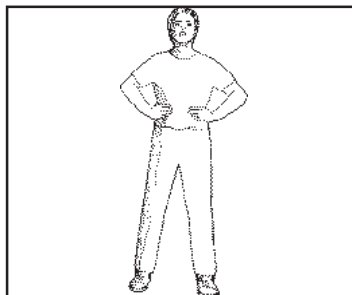
____ 1.



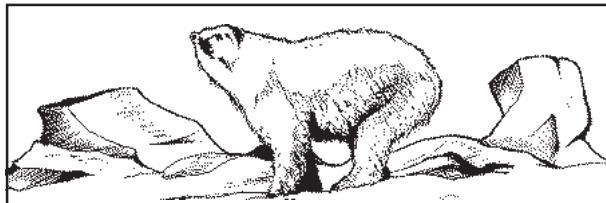
____ 2.



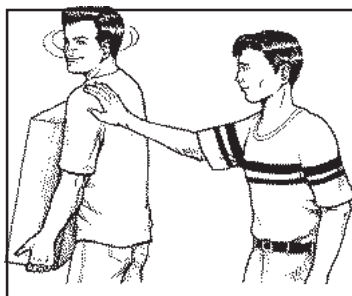
____ 3.



____ 4.



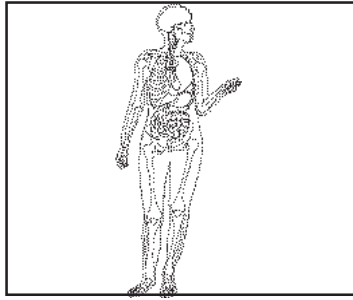
____ 5.



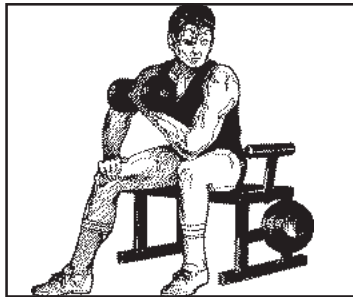
B

- a. Protects the body from the loss of internal fluids or dehydration
- b. Does some metabolic functions
- c. Excretes some waste products via the sebaceous and sweat glands
- d. Serves as a blood reservoir
- e. Protects the internal organs from the outside environment
- f. Maintains homeostasis
- g. Maintains the sites for reception of external cutaneous sensations

_____6.



_____7.



Refer to the preceding discussion for the correct answers.



Let's Remember

- ◆ The **integumentary system** is made up of skin and its glands and outgrowths. It provides protection, sensory perception, temperature regulation and a means of excreting wastes from the human body.
- ◆ The skin and its appendages accomplish several functions, namely:
 1. providing protection for the internal organs from the outside environment;
 2. providing protection from dehydration;
 3. maintaining homeostasis;
 4. excreting some waste products via the sebaceous and sweat glands;
 5. maintaining the sites for the reception of external cutaneous sensations;
 6. serving as a blood reservoir; and
 7. doing some metabolic functions.

The Parts of the Integumentary System and Their Functions

In the previous lesson, you learned the many important functions of the skin and the whole integumentary system. It is a well-organized group of tissues that generally cover the body. Aside from protecting the body, it also serves as an important site of many other metabolic and secretory activities. Human life is therefore not possible without it. In fact, people who get badly burned take a long time to recover from their injuries. But how does the integumentary system accomplish the many wonderful things it does? To better understand this, it is important for you to know more about the structures that comprise the system that is considered “the body’s first line of defense from the environment.”

This lesson will tell you all about the parts of the integumentary system and their functions. You will discover the system’s complex structure that is specially designed to do the many things it does. Are you ready to learn more?



Let’s Think About This

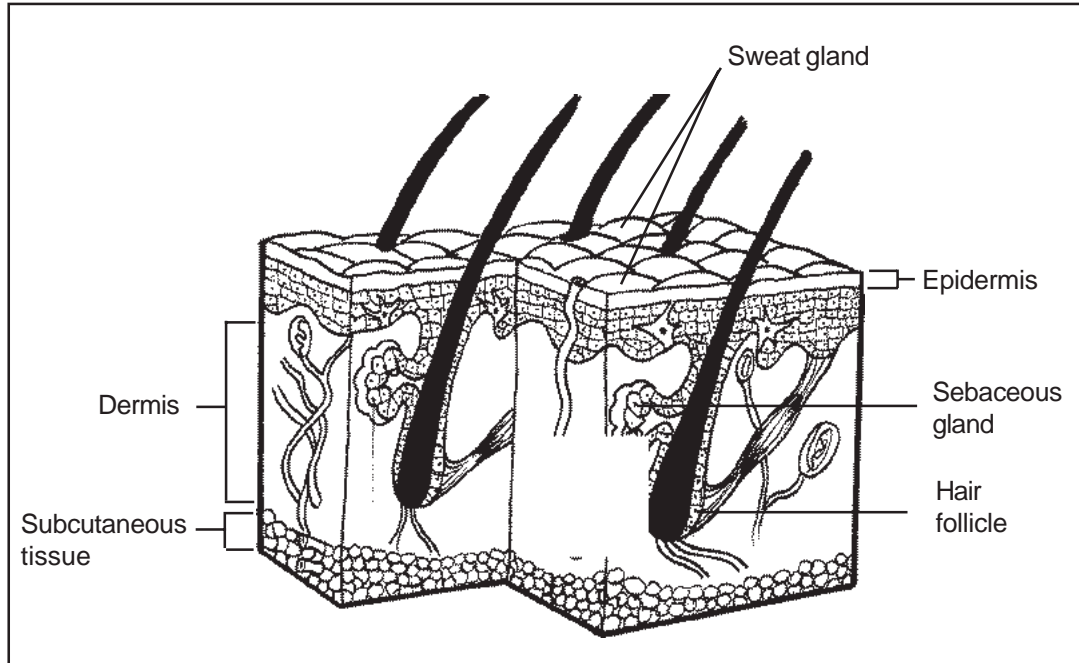
Have you ever suffered from burns on any part of your body? How did you feel? How long did it take to get healed?

Imagine how you would feel if a large portion of your body suffered from burn injuries. What things would you not be able to do? How would this affect your life?



Let's Learn

Have you ever seen your skin up close? What have you noticed about it? Below is a cross section of the human skin showing some of its most important parts.



From the diagram above, what are the parts of the integumentary system? List them below.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

The integumentary system is composed of the following parts: the epidermis, dermis, sebaceous glands, subcutaneous tissues, hair follicles and sweat glands.

The **epidermis** is the outer surface of the skin. Its name is derived from two Greek words: **epi** meaning “over” and **dermis** meaning “skin.” It is about 12 to 15 cells thick beginning with packed taller-than-wide cells at the base with successive layers becoming progressively more squat, flat and dry. Its exterior surface layer consists of hard and callous dead cells consisting mostly of the protein **keratin** which is responsible for keeping the skin waterproof. They are continuously shed and replaced from underneath.

The **dermis** is the inner layer of the skin beneath the epidermis. It contains arterioles and a meshwork of capillaries that supply oxygen and nutrients to both dermal and living epidermal tissues. **Lymph vessels** opening into the dermis provide protection against infections.

The **sebaceous glands** are the tiny glands in the dermis of the skin that protect it by secreting **sebum**. This is the oily substance that lubricates and waterproofs the hair and skin.

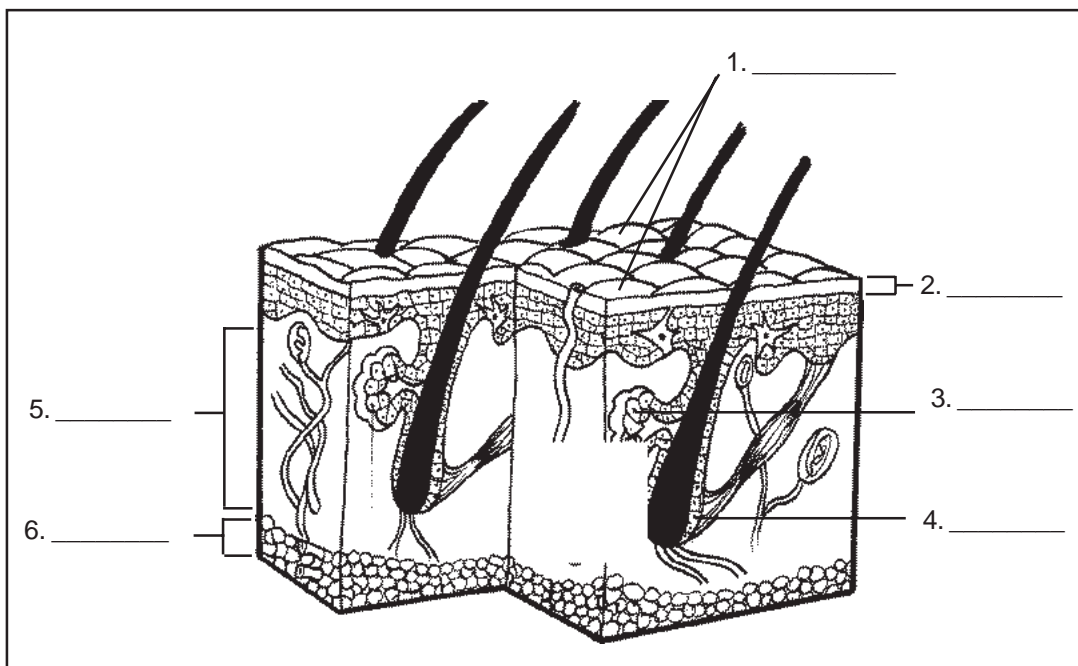
The **subcutaneous tissues** are simply the tissues found under the skin. The **hair follicles** are the pits surrounding the roots of hair. They are lined with cells that synthesize the proteins that form hair. Sebaceous glands, capillary beds, nerve endings and some small muscles are associated with hair follicles.

Finally, the **sweat glands** are the minute curled tubes of the skin's epidermis growing into the dermis which actively secrete sweat.



Let's Review

Label the different parts of the integumentary system in the diagram below.



Compare your completed diagram with the one given beforehand. Were you able to get all the correct answers? If you did, that's very good. You can now proceed to the next part of the lesson. If you didn't, review the parts you made mistakes in before doing so.



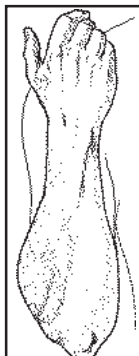
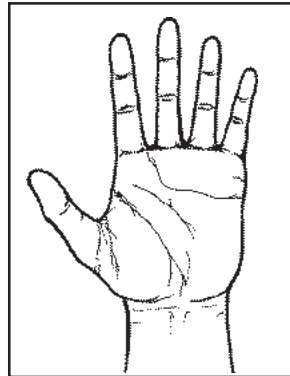
Let's Learn

Recall what you have learned about keratin. What does it do for the integumentary system? Keratin keeps the skin waterproof. It is just one of the important elements that affect your skin. Another protein that affects your skin is **collagen**, a tough fibrous protein of connective tissue found in the skin, bones, teeth, cartilage, ligaments, etc. that form the matrix of the skin. It also makes the skin soft and supple and provides strength, support and form to the skin.

Did you know that . . .

. . . there are two general types of skin depending on the thickness of their epidermis?

The thick skin found on the palms of your hands and the soles of your feet is called **glabrous skin**. It has more compact, keratinized cells in the epidermal layer because it is more exposed to constant rubbing compared to other parts of the body. It is also hairless as compared to the other type.



The thin, hairy type of skin, on the other hand, is called **nonglabrous skin**. It is not usually exposed to constant rubbing thus the lack of thickness.



Let's Try This

Study your own skin. Is the trivia above true? Feel the skin on your face and on the palm of your right hand. How different are they from each other?



Let's Learn

Do you notice how different people have different skin colors? Why do you think this is so?

The epidermis contains **melanin**, the black or brown pigment found in varying degrees in the skin, hair and eyes of humans and animals. The amount of melanin in a person's skin determines what color his/her skin will be. People who have fairer complexions such as the Caucasians have lesser amounts of melanin in their epidermis as compared to us Filipinos.

Did you know that...

... people who have lesser amounts of melanin in their epidermis are more prone to get skin cancer compared to those who are darker in complexion?

So, while everyone wants to become fairer in complexion, it is actually better to be darker in skin color if you don't want to get skin cancer.



Let's Try This

Look at yourself in the mirror. Do you think you have fair complexion? Who else among your family has fair complexion? What factors contributed to this? Do you have foreign blood? Who among your family is of a different nationality?

Compare your findings with a co-learner's.



Let's Learn

Have you noticed that some parts of your body perspire more than other parts? Which parts of your body do you think are we talking about?

Your armpits, buttocks, groin and breasts (if any) perspire more compared to the other parts of your body. This is because they contain a special type of sweat glands that are bigger and hence produce more sweat than the normal-sized ones.

This is also the reason why these parts of the body are more prone to having bad odor. Although sweat glands are generally odorless, they develop a bad smell when contaminated by bacteria.



Let's Think About This

Do you know people who have bad odor? Think of constructive suggestions on how they can get rid of their bad smell. Then tell them in a such a way that they will not feel embarrassed.

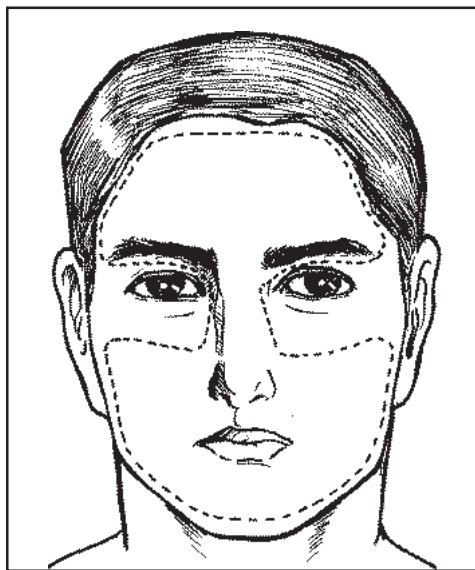
After a week, check for improvements. Do they smell better now? I'm pretty sure they do.



Let's Learn

Aside from sweat, what other substances excreted from the skin may cause a problem?

The oil being secreted by the sebaceous glands can also cause some people skin problems. The oily areas of the body include the scalp, forehead and face. Though the oil may be generally helpful in keeping one's skin soft and supple, too much oil when contaminated by dirt can cause pimples and other skin infections.



Let's Try This

Touch your nose. Can you feel the oily secretions of the sebaceous glands? Touch the other parts of your face, are they as oily as your nose? Compare the oiliness of your face with other parts of your body. In what other areas of your body are sebaceous glands more concentrated?



Let's See What You Have Learned

Write the correct term being defined by each statement below.

- _____ 1. The outer surface of the skin
- _____ 2. The protein which keeps the skin waterproof
- _____ 3. The inner layer of the skin beneath the epidermis
- _____ 4. The part of the dermis that provide protection against infections
- _____ 5. The tissues found under the skin
- _____ 6. The pits surrounding the roots of hair
- _____ 7. The minute curled tubes of skin's epidermis growing down into the dermis which actively secrete sweat
- _____ 8. The fibrous protein of connective tissue found in the skin, bones, teeth, cartilage, ligaments, etc. that forms the matrix of the skin
- _____ 9. The thick skin found on the palms of your hands and the soles of your feet
- _____ 10. The thin, hairy type of skin
- _____ 11. The black or brown pigment found in varying degrees in the skin, hair and eyes of humans and animals
- _____ 12. Tiny openings into the dermis that provide protection against infections

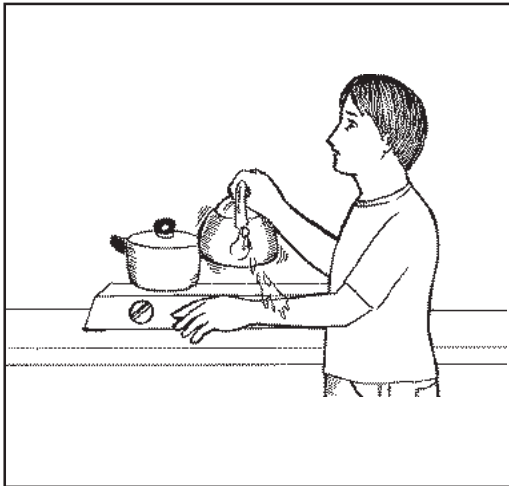
Compare your answers with those in the *Answer Key* on page 36. If you got a perfect score, that's very good! You may proceed to the next lesson. If you didn't, don't worry. Review the parts you missed before doing so.



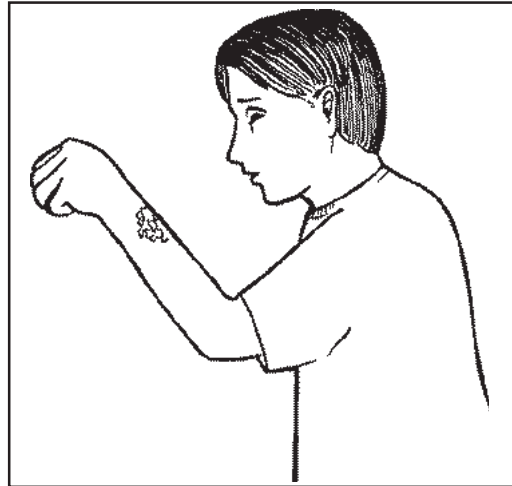
Let's Remember

- ◆ The different parts of the integumentary system are:
 1. **epidermis**—the outer surface of the skin;
 2. **dermis**—the inner layer of the skin beneath the epidermis;
 3. **sebaceous glands**—the tiny glands in the dermis of the skin that protect it by secreting sebum;
 4. **subcutaneous tissues**—the tissues found under the skin;
 5. **hair follicles**—the pits surrounding the roots of hair; and
 6. **sweat glands**—the minute curled tubes of the skin's epidermis growing down into the dermis which actively secrete sweat.
- ◆ **Keratin** is the protein responsible for keeping the skin waterproof.
- ◆ The **lymph vessels** are tiny openings into the dermis that provide protection from infections.
- ◆ **Sebum** is the oily substance that lubricates and waterproofs the hair and skin.
- ◆ **Collagen** is the tough fibrous protein of connective tissue found in the skin, bones, teeth, cartilage, ligaments, etc. that forms the matrix of the skin.
- ◆ There are two general types of skin. These are:
 1. **glabrous**—the thick skin found on the palms of your hands and the soles of your feet; and
 2. **nonglabrous**—the thin, hairy type of skin.
- ◆ **Melanin** is the black or brown pigment found in varying degrees in the skin, hair and eyes of human and animals.

Common Skin Diseases and Injuries: Prevention and Treatment



Jay was already late for school when his mother asked him to boil some water for breakfast. Because he wanted to get to school on time, he was not careful. He spilled boiling water on his arm.



Immediately, he felt a burning sensation on his arm. Later he noticed that part of his arm was blistered.

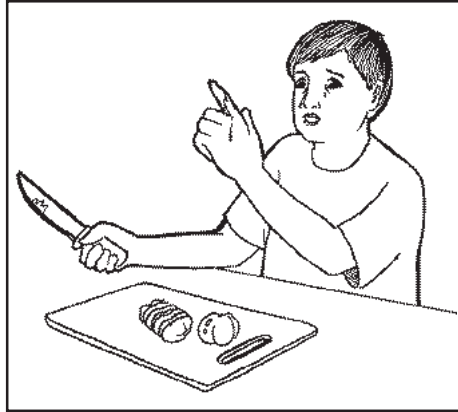
Have you ever experienced something similar to what Jay did? Because he spilled boiling water on his arm, he suffered a minor burn. Redness and swelling are typical in burn cases. What should you do in a situation like this?

In the previous lesson, you learned about the different parts of the integumentary system and their functions. Now, you already have an idea of the great responsibility of the skin to protect you from harm and make you do your work. Although the skin is elastic and quite capable of recovering from some amount of destruction, it is still prone to a lot of injuries and diseases. This lesson will tell you about some of them. It will also tell you how you can take care of your integumentary system in order to be healthy and functioning well. Aside from this, you will also learn about recent technologies available for the treatment of skin injuries.



Let's Think About This

Recall the various skin injuries you have had in the past. How did you treat these injuries?

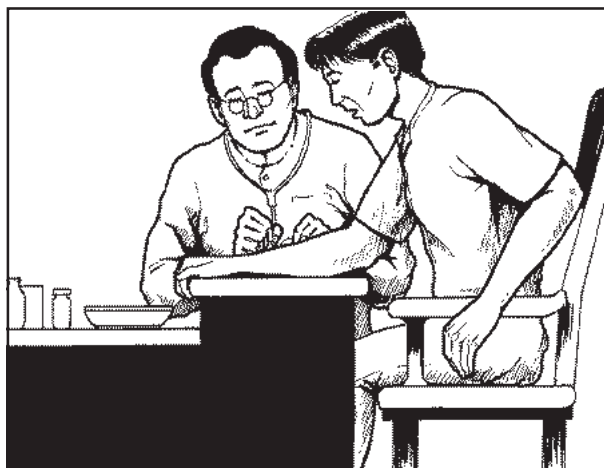


Let's Learn

The skin, no matter how strong, is susceptible to diseases or injuries. A lot of injuries and illnesses can affect it. Below are just some of them.

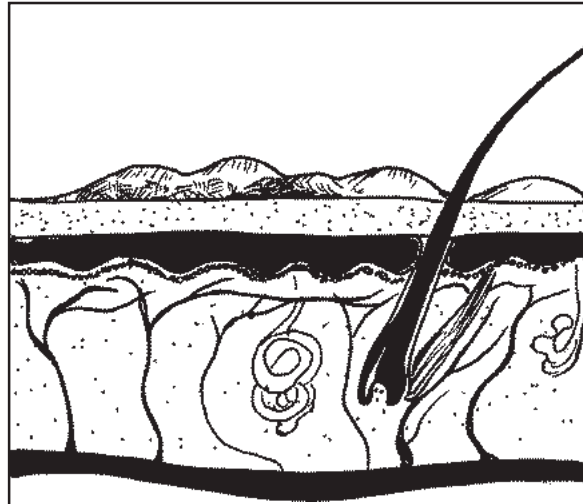
Skin Cuts

Perhaps the most common skin injury is a **cut** or a slit, incision or injury made by cutting. If the cut is very small, chances are the skin would heal on its own. Cleaning the cut with soap and water may be sufficient. Applying antibiotic ointments such as Betadine can also help prevent infection. Covering the wound with a gauze can keep the area clean. Avoid using **merthiolate**, a commonly used skin antiseptic because it has been proven to have high levels of toxic chemicals that can do more harm than good for the skin. You can treat simple skin cuts at home. However, if the cut is big, there might be a need to stitch the broken skin. This is best done in a hospital so that proper treatment is given.



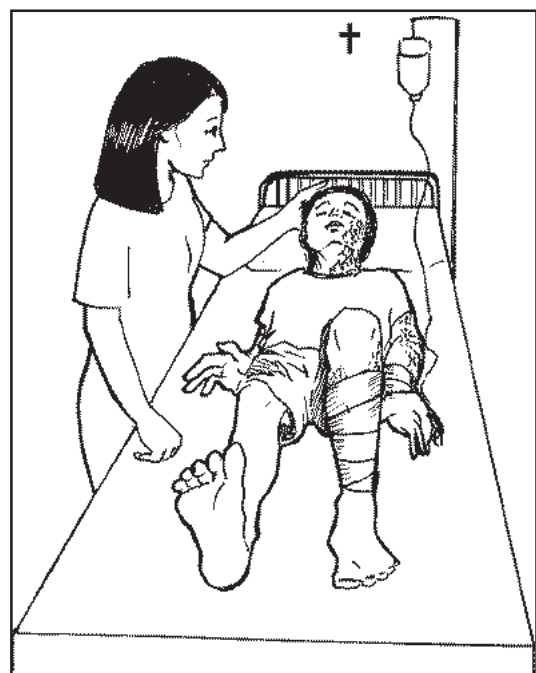
Burns

After cuts, burns are the next most common skin injuries. If the burn is not severe, the skin can heal itself. Redness of the burned body part indicates the presence of blood to speed up repairs. Blisters usually appear on burned skin. A **blister** is a small swelling on or just beneath the surface of the skin, containing watery fluid and occasionally blood or pus, usually caused by friction or a burn.



What to Do in Case of Burns

1. Immediately assess the extent of burning. Burns can be classified into three categories based on the extent of their damage to the skin. A **first-degree burn** denotes the least severe type of burn in which only the outer layer of the skin is damaged, characterized by pain and reddening of the skin surface. It usually heals on its own. A **second-degree burn** is the second most serious of the three degrees of burning with blistering but no permanent damage to the skin. This takes a longer time to heal. A **third-degree burn** is the most serious of the three degrees of burning, with damage to the lower layers of skin tissue. This entails bringing the patient to a hospital for proper treatment or management. This usually causes permanent damage to a patient's skin.



2. Assess how big the affected area is. If the affected area comprises at least one-fourth of the body even if the burn is only of the first degree, the patient must be brought immediately to a hospital for treatment. Since the skin protects the body from harmful elements in the environment, a large burn increases the risk of getting infections.
3. For first-degree burns affecting only very small areas, just apply a cold compress to ease the pain and prevent too much swelling. A cold compress may be prepared by dipping a piece of cloth in cold water.
4. If a blister or a **bullae** or a very large blister appears, never attempt to pop it. It will heal on its own within a few days. Putting cream on the area may help lessen the pain but this should be avoided when a cut in the skin is noted. This may cause further irritation and prolong the healing process.

Psoriasis

Psoriasis, a common noncontagious skin disease of unknown cause, is characterized by red patches covered with white scales mainly on the elbows, knees, scalp and torso. This occurs when the skin rapidly renews within seven days instead of two weeks to one month due to an abnormally increased growth rate of the epidermal layer of the skin. In cases of psoriasis, it is best to consult a **dermatologist** or a doctor who specializes in skin diseases.

Vitiligo

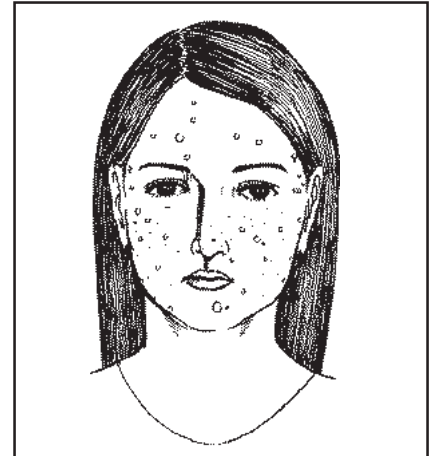
Vitiligo is a condition in which irregular patches of the skin lose color and turn white. It is treatable. The most effective treatment thus far is **psoralen photochemotherapy** (psoralen and ultraviolet-A therapy or PUVA). **Psoralens** are drugs that contain chemicals that react with ultraviolet light to cause darkening of the skin. They can be taken orally or applied on the affected areas. This is followed by carefully timed exposure to ultraviolet-A light from a special lamp or to sunlight. Patients usually receive treatments in their doctors' offices so they can be carefully watched for any side effects. Patients with vitiligo need to avoid exposure to sunlight.



Acne

Acne is a skin disorder common in adolescence, caused by the overactivity of the sebaceous glands especially on the face, chest and back. Stress and lack of sleep can increase the risk of getting acne, contrary to popular belief that eating chocolates and fatty food can cause acne. There is very little evidence linking diet with the occurrence of acne.

So how can you avoid the occurrence of acne? You should never pinch or squeeze pimples. Doing so would just create an opening where harmful infection-causing organisms can enter. Clean your face regularly with soap and water. Too much cleaning though can further irritate your skin. A severe case of acne needs to be taken to a dermatologist.



Scabies

Scabies is a contagious skin disease caused by a secretion of the itch mite which bores under the skin to lay its eggs. It is characterized by severe itching.

Scabies is spread by personal contact, for example, by shaking hands or sleeping together or by close contact with infected articles such as clothing, bedding or towels. It appears as a red rash on the sides of fingers, between the fingers, on the backs of the hands, on the wrists, elbows, armpits, inner thighs and around the waist (belt line). To treat scabies, apply six to ten percent sulfur ointment or cream to the affected area but be sure that you are not allergic to the ointment or cream.

Prickly Heat

Prickly heat is a common condition in which areas of the skin itch intensely and often feel prickly or sting due to overheating. It looks like tiny bumps surrounded by a zone of red skin. It usually occurs on clothed parts of the body such as the back, neck, upper chest, groin or armpits and goes away on its own within a few days. In severe forms, however, prickly heat can interfere with the body's heat-regulating mechanism and cause fever, heat exhaustion and even death.

Athlete's Foot

Athlete's foot is a term used to describe what really is a form of fungal infection of the feet. Sweaty feet, not drying feet well after swimming or bathing, tight shoes or socks and a warm climate all contribute to the development of athlete's foot.

Athlete's foot may affect different people in different ways. Some may have this skin disease between the toes, especially the last two. The affected area peels, cracks and scales. Others may have redness, scaling and even blisters on the soles and along the sides of the feet. These skin changes may be accompanied by itching.

Toenail infections can also occur and can be very difficult to treat. They result in scaling, crumbling and thickening of the nails and even nail loss.

Not all rashes on the feet are athlete's foot though. Before treating a foot rash yourself, check with your dermatologist who can diagnose the condition and prescribe the correct medication. Using over-the-counter preparations on a rash that is not athlete's foot may make your condition worse. If athlete's foot isn't treated, it can result in skin blisters and cracks that can lead to bacterial infections.

Once the fungus is diagnosed, treatment should begin immediately. For simple cases, antifungal creams may be prescribed. The creams can relieve the symptoms quickly. In more severe cases, your dermatologist may prescribe foot soaps before applying anti-fungal creams. If your athlete's foot is stubborn, anti-fungal pills may be prescribed. Toenail infections are very difficult to treat. Research is ongoing to try to find effective ways to treat toenail fungal infections.

It's important to continue the use of your prescribed anti-fungal creams and to take all medication. While your skin may look better, the infection can remain for some time afterward and could recur.

Tinea Versicolor

Tinea versicolor (*an-an*) is a common skin condition due to overgrowth of a skin surface yeast. This overgrowth results in uneven skin color and scaling that can be unsightly and sometimes itchy. The yeast normally lives in the pores of everyone's skin. It thrives in oily areas such as the neck, upper chest and back.

Most people get tinea versicolor when they are teenagers or young adults. It is rare in the elderly and in children, except in tropical climates where it can occur at any age. People with oily skin may be more susceptible than those with naturally dry skin.

Tinea versicolor is treated with either topical or oral medications. Topical treatments include special cleansers including some shampoos, creams or lotions applied directly to the skin once or twice a day. After any form of treatment, the uneven color of the skin may remain several months after the yeast has been eliminated.

Several oral medications have been used successfully to treat tinea versicolor. Because of possible side effects or interactions with other medications though, the use of these medicines should be supervised by your dermatologist.

Tinea versicolor may reappear. To prevent any recurrence, special cleansers are advised to be used once or twice a month.

Each patient is treated by the dermatologist according to the severity and location of the disease. It's important to remember that the yeast is easy to kill but it can take weeks or months for the skin to regain its normal color.

Warts

Warts are noncancerous skin growths caused by a viral infection in the top layer of the skin. Viruses that cause warts are called human papillomavirus (HPV). Warts are usually skin-colored and feel rough to the touch but they can be dark, flat and smooth. The appearance of a wart depends on where it is growing.

Warts are sometimes indirectly passed from person to person. The time from the first contact to the time the warts have grown large enough to be seen is often several months. The risk of catching hand, foot or flat warts from another person is small.

In children, warts can disappear without treatment over a period of several months to years. However, warts that are bothersome, painful or rapidly multiplying should be treated. Warts in adults often do not disappear as easily or as quickly as they do in children.

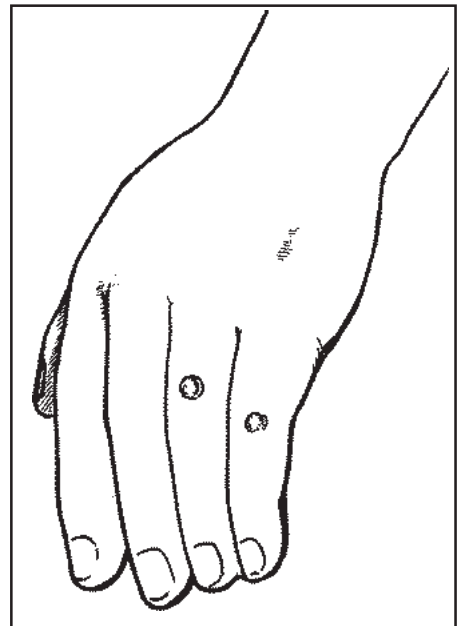
There are some wart remedies available without a prescription. However, you might mistake another kind of skin growth for a wart and end up treating something more serious as though it were a wart. If you have any questions about either the diagnosis or the best way to treat a wart, you should seek your dermatologist's advice.

Laser therapy is used to destroy some types of warts. There are several different lasers used for the treatment of warts. Lasers are more expensive and require the injection of a local anesthesia to numb the area to be treated.

Another treatment is to inject into each wart an anti-cancer drug called **bleomycin**. The injections may be painful and can have other side effects.

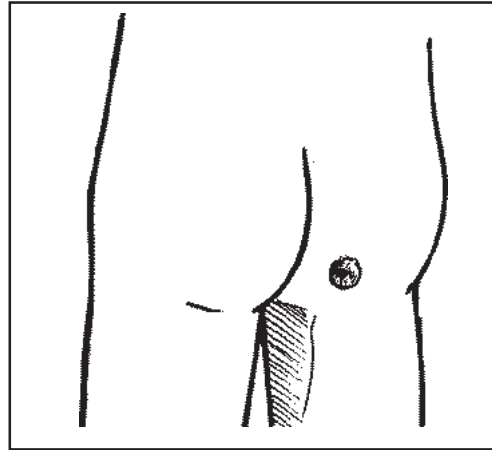
Immunotherapy, which attempts to use the body's own rejection system, is another method of treatment. Several methods of immunotherapy are being used. With one method the patient is made allergic to a certain chemical which is then painted on the wart. A mild allergic reaction occurs around the treated warts and may result in the disappearance of the warts.

Warts may also be injected with **interferon**, a treatment to boost the immune reaction and cause rejection of the warts.



Boils

Boils are staphylococcal skin infections which involve hair follicles. They are often referred to as **furuncles**. A group of boils is called a **carbuncle**. Boils have been found to be tender, pea-sized or even larger, red nodules that may ooze pus or **weep**. They can be treated by using warm, wet compresses several times a day. Oral or topical antibiotics may also be used in some cases.



Skin Tumors and Skin Cancer

Skin tumors or lumps are not always malignant. They do not always rapidly grow and spread to other parts of the body. Sometimes, tumors are benign and will spontaneously regress in time.

Malignant skin tumors though can lead to **skin cancer**, caused by a variety of agents including chemicals and chronic X-ray exposure and as a result of sun damage to the skin. The incidence of all skin cancers is directly related to a person's location on the earth measured in latitude. The closer an area is to the equator where the sun's rays are most intense, the higher the incidence of skin cancers in that area.

Many skin cancers develop after a long time has passed since the episode of sun exposure. It appears that one significant sunburn suffered in the teens or twenties may produce genetic changes in skin cells which lead to tumor development 15 to 25 years later. Hence, the importance of prevention in the young.

Skin Allergies

Skin allergies are reactions caused by contact of the skin with a certain substance. The symptoms usually include red, inflamed and itchy skin. Bumps or blisters that break and ooze a clear liquid may also develop. Sometimes, these can be traced to things that touch the skin but often the cause remains unknown. Jewelry, snaps and zippers in clothing made of metals such as nickel, chrome and mercury can cause skin allergies in some people. That is why **hypoallergenic products**, now being produced and sold in the market, are specially formulated so they won't harm the skin. Food and other substances that are taken in orally can also cause allergies.

Many times doctors can recommend over-the-counter or prescription treatments for skin allergies depending on the severity of the outbreak. In all skin allergy cases, avoiding the irritant is the best way to prevent a reaction. Consult your doctor if you come in contact with a known irritant or if you develop any unexplained skin irritation.

Leprosy

Leprosy is an infectious disease caused by the bacteria *Mycobacterium leprae*. Most people have a natural immunity to the disease and those that develop leprosy can be cured with modern multi-drug therapy treatment (MDT). The leprosy germ affects nerves which lie near the skin and if untreated can lead to a loss of feeling in the affected parts of the body. Most at risk are the hands, feet and face. Because the person affected with the germ cannot feel, wounds or other injuries go unnoticed or untreated. Life-long care of anesthetic limbs is one of the greatest challenges faced by people affected by leprosy. Thus, neglect can cause damages so severe as to cause partial paralysis such as clawed fingers and an inability to blink, resulting in corneal ulcers and even blindness.



Let's Think About This

What are some of the things you can do to maintain the health of your skin and avoid skin diseases? List down as many as you can below.

Have your Instructional Manager or Facilitator check your work afterward.



Let's Learn

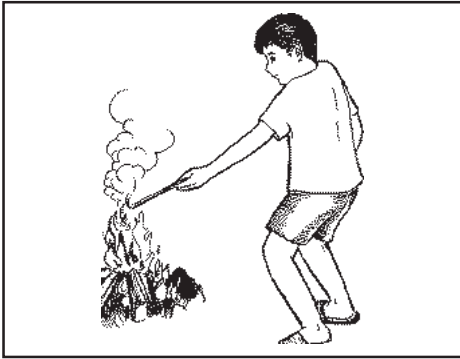
The following are some things you can do to take care of your skin and integumentary system as well.



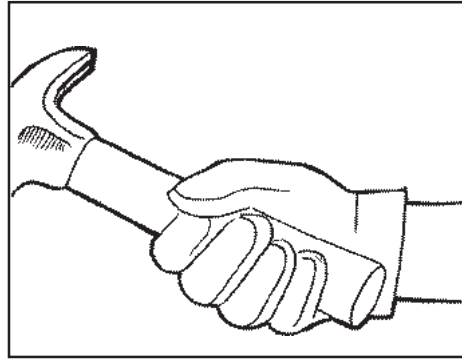
Eat a lot of protein-rich foods such as milk, meat and soya beans.



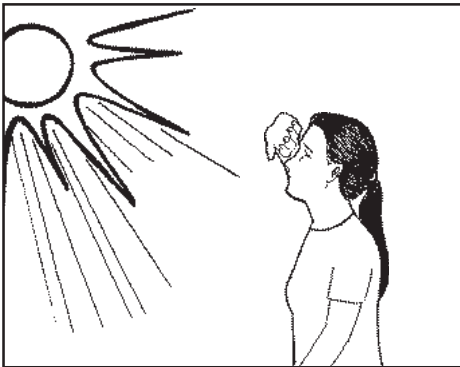
Make sure that you get plenty of vitamin A from eating vegetables.



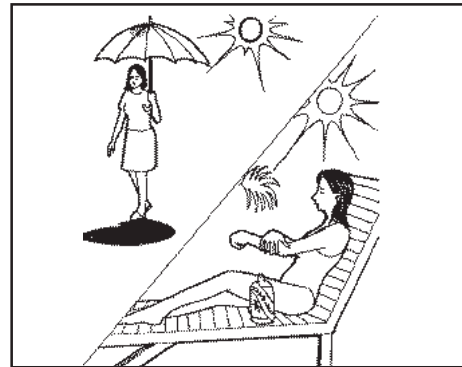
Avoid activities that may cause skin injuries such as burns and cuts.



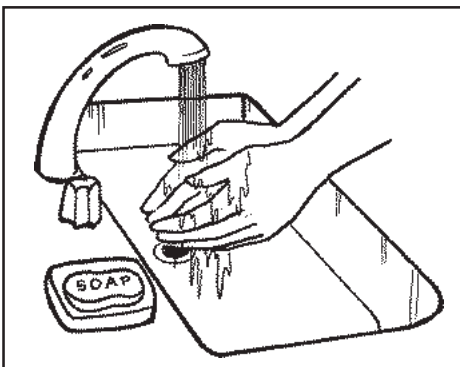
Always wear or use protective equipment to prevent skin injuries.



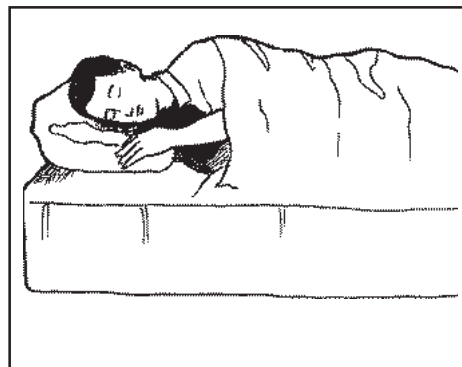
Avoid too much sun exposure which can lead to skin tumors and even skin cancers.



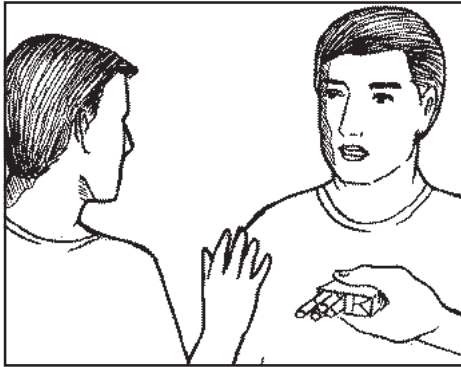
Use an umbrella if you are staying long under the sun. Using sunblock is also recommended when sunbathing.



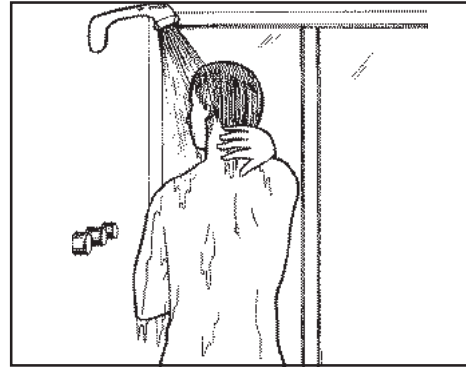
Keep your skin clean. Wash your whole body thoroughly.



Always get enough rest. Stress can affect your skin too!



Stop smoking because it makes skin age faster.



Maintain proper hygiene. Take a bath every day to keep your skin clean and free from infections.



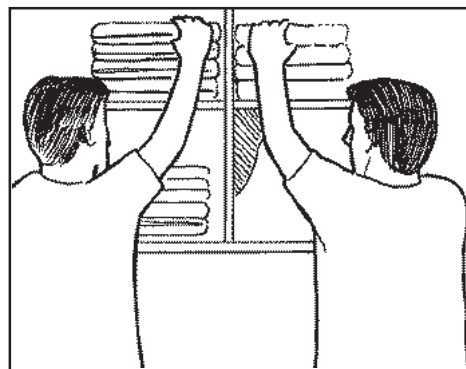
Be careful when using skin products. Some may cause irritation and skin allergies.



Always seek medical help when an unexplained mark or lesion is noted on the skin. It could be a sign of a bigger health problem.



Always keep your feet dry to avoid getting athlete's foot. Use foot powder to prevent dampness and limit fungal infection.



Avoid contact with people who have skin lesions. Diseases such as scabies and leprosy are contagious and can be transferred through direct skin contact.



Let's See What You Have Learned

Enumerate the following.

A. Five ways of taking good care of your skin

1. _____
2. _____
3. _____
4. _____
5. _____

B. Three common skin injuries or diseases

6. _____
7. _____
8. _____

C. Two things you should do to a person suffering from a burn

9. _____
10. _____

Compare your answers with those in the *Answer Key* on pages 36 and 37. If you got a perfect score, that's very good. You may go to the next part of the module. If you didn't, review the parts you missed first before doing so.



Let's Remember

- ◆ The following are just some of the common skin injuries/diseases:
 1. **skin cuts**—slits, incisions or injuries made by cutting;
 2. **burns**—injuries or marks caused by fire, heat, acid, friction, etc.;
 3. **psoriasis**—a common noncontagious skin disease of unknown cause, characterized by scales;
 4. **vitiligo**—a condition in which irregular patches of skin lose color and turn white;
 5. **acne**—a skin disorder, common in adolescence, caused by the overactivity of the sebaceous glands;

6. **scabies**—a contagious skin disease caused by a secretion of the itch mite;
7. **prickly heat**—a common condition in which areas of the skin itch intensely and often feel prickly or sting due to overheating;
8. **athlete's foot**—a term used to describe what really is a form of fungal infection of the feet;
9. **tinea versicolor**—a common skin condition due to overgrowth of a skin surface yeast;
10. **warts**—noncancerous skin growths caused by a viral infection in the top layer of the skin
11. **boils**—staphylococcal skin infections which involve hair follicles;
12. **skin tumors**—skin lumps which are not always malignant or cancerous;
13. **skin cancer**—disease caused by a variety of agents including chemicals and chronic X-ray exposure and as a result of sun damage to the skin;
14. **skin allergies**—reactions caused by contact of the skin with a certain substance; and
15. **leprosy**—an infectious disease caused by the bacteria *Mycobacterium leprae*.

- ◆ The following are some things you can do to keep your integumentary system healthy:
 1. Eat a lot of protein-rich foods.
 2. Make sure that you get plenty of vitamin A by eating vegetables.
 3. Avoid activities that may cause skin injuries.
 4. Always wear or use protective equipment to prevent skin injuries.
 5. Avoid too much sun exposure.
 6. Use an umbrella if you are staying long under the sun.
 7. Keep your skin clean.
 8. Always get enough sleep and rest.
 9. Stop smoking.
 10. Maintain proper hygiene.

11. Be careful when using skin products.
12. Always seek medical help when an unexplained mark or lesion is noted on the skin.
13. Always keep your feet dry.
14. Avoid contact with people who have skin lesions.

Well, this is the end of the module. Congratulations for finishing it! Did you like it? Did you learn anything from it? A summary of its main points is given below to help you remember them better.



Let's Sum Up

- ◆ The integumentary system is made up of the skin and its glands and outgrowths. It provides protection, sensory perception, temperature regulation and a means of excreting wastes from the human body.
- ◆ The skin and its appendages accomplish several functions, namely:
 1. providing protection for the internal organs from the outside environment;
 2. providing protection from dehydration;
 3. maintaining homeostasis;
 4. excreting some waste products via the sebaceous and sweat glands;
 5. maintaining the sites for reception of external cutaneous sensations;
 6. serving as a blood reservoir; and
 7. doing some metabolic functions.
- ◆ The different parts of the integumentary system are:
 1. **epidermis**—the outer surface of the skin;
 2. **dermis**—the inner layer of the skin beneath the epidermis;
 3. **sebaceous glands**—the tiny glands in the dermis of the skin that protect it by secreting sebum;
 4. **subcutaneous tissues**—the tissues found under the skin;
 5. **hair follicles**—the pits surrounding the roots of hair; and
 6. **sweat glands**—the minute curled tubes of the skin's epidermis growing down into the dermis which actively secrete sweat.

- ◆ **Keratin** is the protein responsible for keeping the skin waterproof.
- ◆ The **lymph** vessels of the integumentary system protect it from infections.
- ◆ **Sebum** is the oily substance that lubricates and waterproofs the hair and skin.
- ◆ **Collagen** is a tough fibrous protein of connective tissue found in the skin, bones, teeth, cartilage, ligaments, etc. that forms the matrix of the skin.
- ◆ There are two general types of skin. These are:
 1. **glabrous**—the thick skin found on the palms of your hands and the soles of your feet; and
 2. **nonglabrous**—the thin, hairy type of skin.
- ◆ **Melanin** is the black or brown pigment found in varying degrees in the skin, hair and eyes of humans and animals.
- ◆ The following are just some of the common skin injuries/diseases:
 1. **skin cuts**—slits, incisions or injuries made by cutting;
 2. **burns**—injuries or marks caused by fire, heat, acid, friction, etc.
 3. **psoriasis**—a common noncontagious skin disease of unknown cause, characterized by scales;
 4. **vitiligo**—a condition in which irregular patches of skin lose color and turn white;
 5. **acne**—a skin disorder, common in adolescence, caused by the overactivity of the sebaceous glands;
 6. **scabies**—a contagious skin disease caused by a secretion of the itch mite;
 7. **prickly heat**—a common condition in which areas of the skin itch intensely and often feel prickly or sting due to overheating;
 8. **athlete's foot**—a term used to describe a form of fungal infection of the feet.
 9. **tinea versicolor**—a common skin condition due to overgrowth of a skin surface yeast;
 10. **warts**—noncancerous skin growths caused by a viral infection in the top layer of the skin;
 11. **boils**—staphylococcal skin infections which involve hair follicles;
 12. **skin tumors**—skin lumps which are not always malignant or cancerous;

13. **skin cancer**—disease caused by a variety of agents including chemicals and chronic X-ray exposure and as a result of sun damage to the skin;
 14. **skin allergies**—reactions caused by contact of the skin with a certain substance; and
 15. **leprosy**—an infectious disease caused by the bacteria *Mycobacterium leprae*.
- ◆ The following are some things you can do to keep your integumentary system healthy:
1. Eat a lot of protein-rich foods.
 2. Make sure that you get plenty of vitamin A by eating vegetables.
 3. Avoid activities that may cause skin injuries.
 4. Always wear or use protective equipment to prevent skin injuries.
 5. Avoid too much sun exposure.
 6. Use an umbrella if you are staying long under the sun.
 7. Keep your skin clean.
 8. Always get enough sleep and rest.
 9. Stop smoking.
 10. Maintain proper hygiene.
 11. Be careful when using skin products.
 12. Always seek medical help when an unexplained mark or lesion is noted on the skin.
 13. Always keep feet dry.
 14. Avoid contact with people who have skin lesions.



What Have You Learned?

Answer the following questions briefly.

1. What is the integumentary system? How does it work?

2. What are the different parts of the integumentary system? What are their functions?

a.

b.

c.

d.

e.

f.

3. List down three common skin injuries/diseases below. What characterizes each injury/disease?

a.

b.

c.

4. List down three ways of taking good care of your skin and integumentary system.

- a. _____

- b. _____

- c. _____

Compare your answers with those in the *Answer Key* on page 38. Did you get a perfect score? If you did, that's very good. You may now study a new module. If you didn't, review the parts you made mistakes in first before doing so.



Answer Key

A. Let's See What You Already Know (*page 2*)

1. (g)
2. (a)
3. (h)
4. (c)
5. (i)
6. (e)
7. (j)
8. (f)
9. (d)
10. (b)

B. Lesson 1

Let's See What You Have Learned (pages 7–8)

1. (b)
2. (d)
3. (a)
4. (f)
5. (g)
6. (e)
7. (c)

C. Lesson 2

Let's Review (page 11)

1. sweat gland
2. epidermis
3. sebaceous gland
4. hair follicle
5. dermis
6. subcutaneous tissue

Let's See What You Have Learned (page 15)

1. epidermis
2. keratin
3. dermis
4. sebaceous glands
5. subcutaneous tissues
6. hair follicles
7. sweat glands
8. collagen
9. glabrous skin
10. nonglabrous skin
11. melanin
12. lymph vessels

D. Lesson 3

Let's See What You Have Learned (page 28)

A. Choose any five of the following:

1. Eat a lot of protein-rich foods.
2. Make sure that you get plenty of vitamin A by eating vegetables.
3. Avoid activities that may cause skin injuries.
4. Always wear or use protective equipment to prevent skin injuries.
5. Avoid too much sun exposure.
6. Use an umbrella if you are staying long under the sun.
7. Keep your skin clean.
8. Always get enough sleep and rest.
9. Stop smoking.
10. Maintain proper hygiene.
11. Be careful when using skin products.
12. Always seek medical help when an unexplained mark or lesion is noted on the skin.
13. Always keep your feet dry.
14. Avoid contact with people who have skin lesions.

B. Choose any three of the following:

1. **skin cuts**—slits, incisions or injuries made by cutting
2. **burns**—injuries or marks caused by fire, heat, acid, friction, etc.
3. **psoriasis**—a common noncontagious skin disease of unknown cause, characterized by scales
4. **vitiligo**—a condition in which irregular patches of skin lose color and turn white
5. **acne**—a skin disorder, common in adolescence, caused by the overactivity of the sebaceous glands
6. **scabies**—a contagious skin disease caused by a secretion of the itch mite
7. **prickly heat**—a common condition in which areas of the skin itch intensely and often feel prickly or sting due to overheating
8. **athlete's foot**—a term used to describe what really is a form of fungal infection of the feet
9. **tinea versicolor**—a common skin condition due to overgrowth of a skin surface yeast
10. **warts**—noncancerous skin growths caused by a viral infection in the top layer of the skin
11. **boils**—staphylococcal skin infections which involve hair follicles
12. **skin tumors**—skin lumps which are not always malignant or cancerous
13. **skin cancer**—disease caused by a variety of agents including chemicals and chronic X-ray exposure and as a result of sun damage to the skin
14. **skin allergies**—reactions caused by contact of the skin with a certain substance
15. **leprosy**—an infectious disease caused by the bacteria *Mycobacterium leprae*

C. Choose any two of the following:

1. Immediately assess the extent of burning.
2. Assess how big the affected area is.
3. For first-degree burns affecting only very small areas, just apply a cold compress to ease the pain and prevent too much swelling.
4. If a blister or a bullae appears, never attempt to pop it.

E. What Have You Learned? (pages 33–34)

1. The integumentary system, composed of the skin and its glands and outgrowths, provides protection, sensory perception, temperature regulation and a means of excreting wastes to the human body.
2.
 - a. **epidermis**—the outer surface of the skin
 - b. **dermis**—the inner layer of the skin beneath the epidermis
 - c. **sebaceous glands**—the tiny glands in the dermis of the skin that protect it by secreting sebum
 - d. **subcutaneous tissues**—the tissues found under the skin
 - e. **hair follicles**—the pits surrounding the roots of hair
 - f. **sweat glands**—the minute curled tubes of the skin’s epidermis growing down into the dermis which actively secrete sweat
3. Choose any three from the answers in B, *Let’s See What You Have Learned* of Lesson 3.
4. Choose any three from the answers in A, *Let’s See What You Have Learned* of Lesson 3.



Glossary

Acne A skin disorder, common in adolescence, caused by the overactivity of the sebaceous glands.

Antibiotic Substance produced or derived from microorganisms that can selectively destroy or inhibit other bacteria or fungi without damaging the host.

Athlete’s foot A term used to describe what really is a form of fungal infection of the feet.

Betadine An antiseptic microbiocide that can be used for wound cleaning.

Blister A small swelling on or just beneath the surface of the skin, containing watery fluid and occasionally blood or pus, usually caused by friction or a burn.

Boils Staphylococcal skin infections which involve hair follicles.

Bullae A very large blister.

Burns Injuries or marks caused by fires, heat, acids, friction, etc.

Carbuncle A group of boils

Collagen Tough fibrous protein of connective tissue found in the skin, bones, teeth, cartilage, ligaments, etc. that forms matrix of the skin.

Cutaneous sensations Sensations that have to do with body tissues.

Dehydration The loss of internal fluids.

Dermatologist A doctor who specializes in skin diseases.

Dermis The inner layer of the skin beneath the epidermis.

Epidermis The outer surface of the skin.

First-degree burn Denotes the least severe type of burn in which only the outer of the skin is damaged, characterized by pain and redness of the skin surface.

Furuncles Another name for boils.

Glabrous skin The thick skin found on the palms of the hands and soles of the feet.

Hair follicles The pits surrounding the roots of hair.

Homeostasis The tendency of an animal or organism to maintain a constant internal environment regardless of varying external conditions.

Immunotherapy A method of treating diseases by using the body's own rejection system.

Interferon A treatment to boost the immune reaction and cause rejection of a wart.

Integumentary system Made up of the skin and its glands and outgrowths which provides protection, sensory perception, temperature regulation and a means of excreting wastes from the human body.

Keratin Responsible for keeping the skin waterproof.

Leprosy An infectious disease caused by the bacteria *Mycobacterium leprae*.

Lymph vessels Provides protection against infections.

Melanin The black or brown pigment found to varying degrees in the skin, hair and eyes of humans and animals.

Merthiolate A commonly used skin antiseptic that has been proven to have high levels of toxic chemicals that can harm the skin.

Nonglabrous skin The thin, hairy type of skin.

Oral Taken in through the mouth.

Prickly heat A common condition in which areas of the skin itch intensely and often feel prickly or sting due to overheating.

Psoralens Drugs that contain chemicals that react with ultraviolet light to cause darkening of the skin.

Psoralen photochemotherapy Also known as psoralen and ultraviolet-A (PUVA) therapy.

Psoriasis A common noncontagious skin disease of unknown cause, characterized by scales.

Scabies A contagious skin disease caused by a secretion of the itch mite.

Sebaceous glands The tiny glands in the dermis of the skin that protect it by secreting sebum.

Sebum The oily substance that lubricates and waterproofs the hair and skin.

Second-degree burn The second most serious of the three degrees of burning with blistering but not permanent damage to the skin.

Skin allergies Reactions caused by contact of the skin with a certain substance.

Skin cancer Caused by a variety of agents including chemicals and chronic X-ray exposure and as a result of sun damage to the skin.

Skin cuts Slits, incisions or injuries made by cutting.

Skin tumors Lumps on the skin that may be benign or malignant.

Subcutaneous tissues The tissues found under the skin.

Sweat glands The minute curled tubes of the skin's epidermis growing down into the dermis which actively secrete sweat.

Third-degree burn The most serious of the three degrees of burning, with damage to the lower layers of skin tissues.

Tinea versicolor A common skin condition due to overgrowth of a skin surface yeast.

Topical Said of an ointment or treatment, etc. applied externally to the body.

Vitiligo A condition in which irregular patches of the skin lose color and turn white.

Warts Noncancerous skin growths caused by a viral infection in the top layer of the skin.

Weep The ability of boils to ooze pus.



References

- Altrius Biomedical Network. 2000. *Cancer Questions*. <http://www.cancer-drug.com/index.html>. January 31, 2001, date accessed.
- Altrius Biomedical Network. 2000. *Tumors of the Skin*. <http://www.cancer-drug.com/skintumr.html>. January 31, 2001, date accessed.
- American Academy of Dermatology. 1999. *Athlete's Foot* <http://www.aad.org/pamphlets/AthleteFoot.html>. January 30, 2001, date accessed.
- American Academy of Dermatology. 1999. *Tinea Versicolor*. <http://www.aad.org/pamphlets/tineav.html>. January 30, 2001, date accessed.
- American Academy of Dermatology. 1999. *Warts*. <http://www.aad.org/pamphlets/warts.html>. January 30, 2001, date accessed.
- Care Group Healthcare System. *Skin Allergies*. <http://www.caregroup.org/Health/skinallergies.htm>. January 30, 2001, date accessed.
- D.S.H.I Systems. 1996. *Boils*. http://medhlp.netusa.net/glossary/new/gls_0748.htm. January 30, 2001, date accessed.
- Farabee, M. J. 2000. *The Integumentary System*. <http://www.gened.emc.maricopa.edu/bio181/BIOBK/BioBookINTEGUSYS.html>. January 29, 2001, date accessed.
- Homeworkhelp.com. *The Integumentary System*. <http://www.homeworkhelp.com/homeworkhelp/freemember/text/bio/high/private/ch/main.html>. January 29, 2001, date accessed.
- Jackson, Gaines B. 2000. *The Integumentary (Skin) System*. <http://www.rose.cc.ok.us/faculty/gjackson/inte-sys.htm>. January 29, 2001, date accessed.
- Junquiera, L.C., J. Carneiro and R. Kelly. *Basic Histology*. U.S.A.: Prentice-Hall, 1989.
- National Institute of Arthritis and Musculoskeletal and Skin Disease. 1997. *Questions and Answers About Vitiligo*. <http://www.nih.gov/niams/healthinfo/vitiligo.htm>. January 30, 2001, date accessed.
- OnHealth.com. 1999. *Prickly Heat*. <http://onhealth.webmd.com/conditions/resource/conditions/resource/conditions/item,41711.asp>. January 30, 2001, date accessed.

- PRPS.org. 2000. *Skin Cancer*. <http://www.frps.org/skinCa.html>. January 31, 2001, date accessed.
- The Leprosy Mission International. *Leprosy: What Is It—And Why The Myths?* <http://www.leprosymission.org/what.htm>. January 30, 2001, date accessed.
- Tvedten, Steve. Facts About Scabies. <http://www.safe2use.com/pests/scabies.htm>. January 30, 2001, date accessed.
- Van de Graaff, K. and Stuart I.F. Forx. *Concepts of Human Anatomy and Physiology*. Iowa, U.S.A.: WM Publishers, 1985.