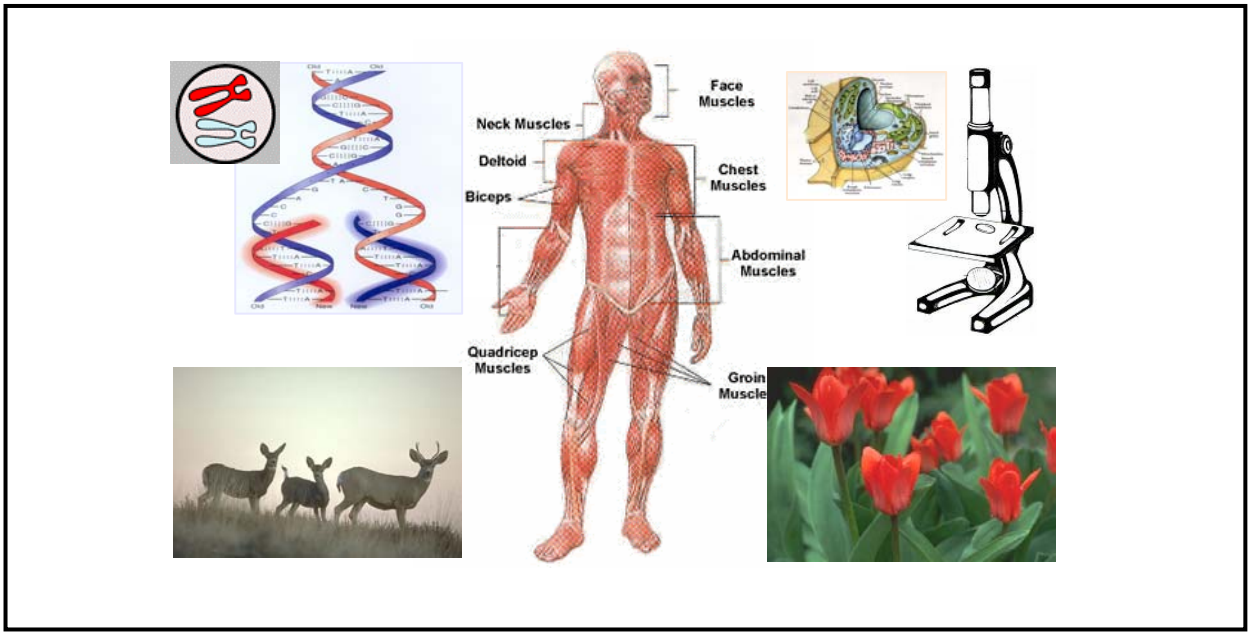
Project EASE

(Effective Alternative Secondary Education)

BIOLOGY



MODULE 8

The Integumentary and Excretory Systems

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Department of Education
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Module 8
The Integumentary and Excretory Systems

What this module is about

Did you have a nice time learning about the energy producing and distributing systems? You've got to learn more systems to complete your knowledge about the human body.

Living cells form chemical wastes. One of these wastes is carbon dioxide gas that is exhaled by the lungs. Other organs, such as your skin and kidneys, help in getting rid of liquid waste materials.

In this module, the following lessons are prepared for you.

- **Lesson 1 – The Integumentary System**
- **Lesson 2 – The Excretory System**
- **Lesson 3 – Problems of the Integumentary and Excretory System**

What you are expected to learn

After finishing this module, you will have a working knowledge of the functions of the integumentary and urinary systems. Specifically, you are expected to:

1. List the important functions of the integumentary systems.
2. When provided with a model or diagram of the skin, recognize and name the different skin structures.
3. Describe the characteristics and functions of each structure.
4. Describe the location of the kidney in the body.
5. Identify the organs that comprise the excretory system.
6. Name the three major types of body wastes.
7. Explain the function of the kidneys in the excretion of nitrogen-containing wastes.
8. Discuss common problems of the integumentary and excretory systems and ways of keeping them healthy.

How to learn from this module

1. Read and follow directions carefully.
2. Answer the pretest before you start the lesson.
3. Take notes and record points for clarification.
4. Try to achieve at least 75% level of proficiency in the tests.
5. Work diligently and honestly.
6. Answer the posttest honestly.

What to do before (Pretest)

I. **Multiple Choice**. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. The two major organs that remove chemical waste are the skin and the
   a. anus
   b. eyes
   c. kidneys
   d. nose

2. What layer of the skin prevents evaporation of body fluids?
   a. dermis
   b. epidermis
   c. sebaceous
   d. subcutaneous

3. Which gland helps the body excrete waste and control body temperature?
   a. dermis
   b. epidermis
   c. sebaceous
   d. subcutaneous

4. The organs below are parts of the integumentary system, **except**:
   a. hair
   b. kidneys
   c. nails
   d. skin

5. What organs act as filters by removing wastes such as urea from the blood?
   a. kidneys
   b. heart
   c. liver
   d. lungs

6. These are the two major functions of the kidneys:
   a. bring and carry out blood
   b. clean blood and remove the chemical waste
   c. excrete sweat and urine
   d. excrete waste and control body temperature

7. The process by which a person gets rid of wastes is called
    a. digestion
    b. circulation
    c. excretion
    d. respiration

8. This system is made up of organs that rid the body of liquid wastes.
    a. circulatory
    b. digestive
    c. excretory
    d. urinary

9. The organ where urine passes from the kidneys to the urinary bladder is the
    a. pelvis
    b. ureter
    c. urethra
    d. urinary bladder

10. The main excretory organ of the body is/are the
    a. skin
    b. liver
    c. kidneys
    d. large intestine

11. The microscopic filtering units of the kidneys which remove wastes from the blood are the
    a. glomeruli
    b. nephrons
    c. medulla
    d. renal pelvis

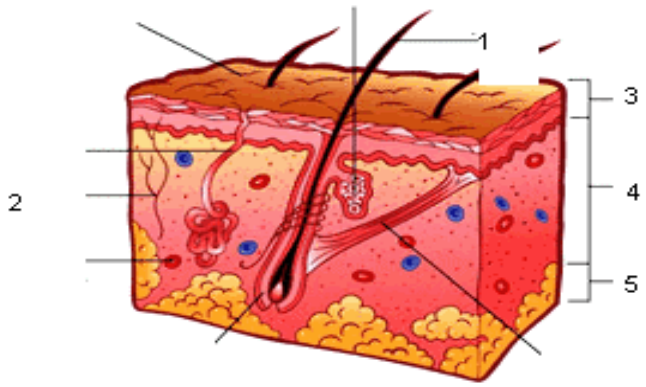
12. The organ/s which help(s) get rid of carbon dioxide and excess heat in the body is/are the
    a. kidneys
    b. large intestines
    c. liver
    d. skin

13. The system that helps keep the body fluids at a constant level is the
    a. excretory
    b. digestive
    c. integumentary
    d. respiratory

14. The integumentary system collects chemical wastes and excretes them as
    a. amino acids
    b. feces
    c. sweat
    d. urine

15. The kidneys filter blood and excrete waste as
    a. carbon dioxide
    b. feces
    c. sweat
    d. urine

II. Try to recall the parts of the skin as numbered below.



Key to answers on page 21.

Lesson 1. Integumentary system

Your body is like a factory, constantly building new materials and producing waste products such as smoke, solid garbage, and dirty water. Waste products must be removed if a factory is to continue operating

Your body makes and excretes waste products similar to those in a factory. First, carbon dioxide waste is removed by the respiratory system. Second, the solid waste, or feces, is excreted by the digestive system. It is the third type of waste that is especially dangerous to the body--chemical waste products. Most of the body's chemical waste products come from the chemical reactions of proteins. These waste products contain nitrogen. Wastes with nitrogen in them are poisonous and must be removed from the body as quickly as possible.

What you will do

Self-Test 1.1

Complete the table below with the correct answer.

The Three Major Types of Body Wastes

Type	Example	System used
Gaseous wastes	_____	_____
Solid wastes	_____	_____
Chemical wastes	_____	_____

The two major organs that remove chemical waste are the skin and the kidneys. The skin is part of the integumentary system while the kidneys are part of the excretory system.

1. Name the three major types of body wastes
2. What kind of wastes result from the chemical reactions of protein?
3. Why must the body remove waste products?
4. Name the two major organs of excretion. To what systems do these organs belong?

Key to answers on page 21.

Your First Impression

When you meet people for the first time, what do you notice? Chances are you notice their appearance. You don't just see their special features; you also see how they take care of their skin, hair, nails, and teeth. You may also notice their clothes, facial expressions, and posture. When others meet you, what impressions do they form about you? Do you make the best impression about yourself?

Your Skin

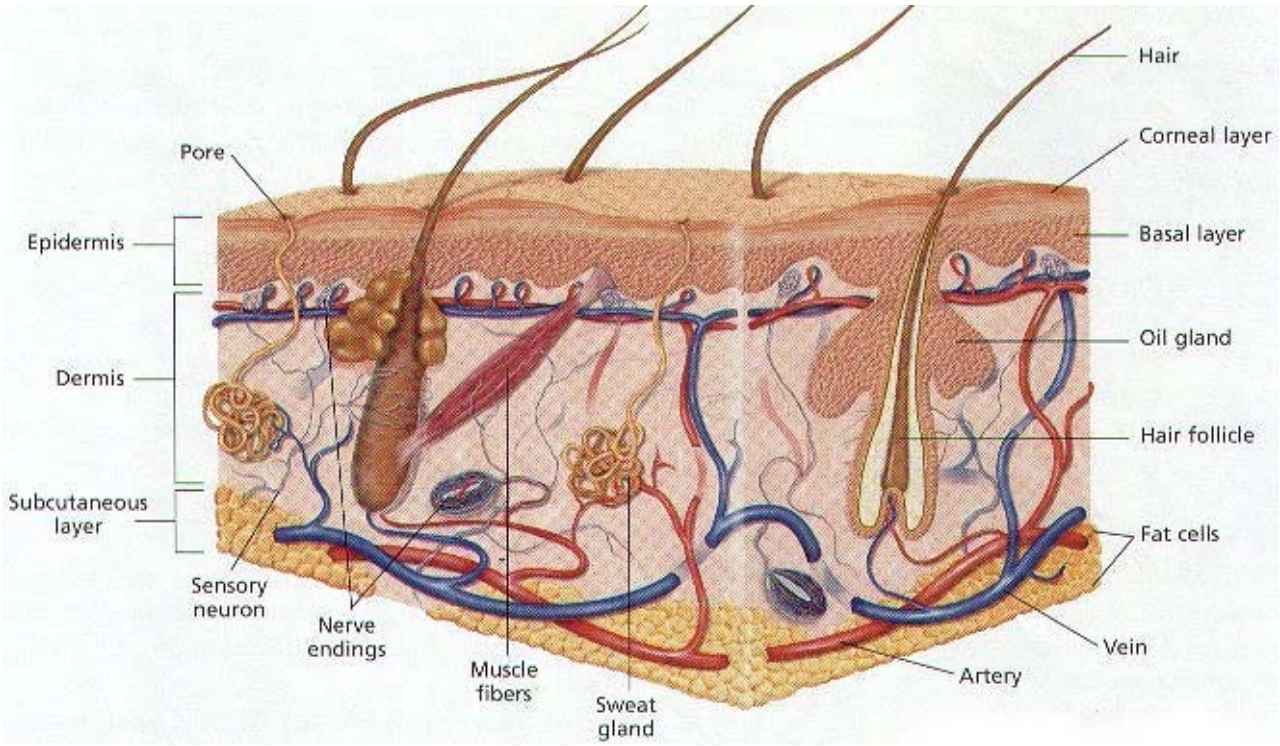


Figure 1. The Human Skin
http://www.sirinet.net/~jgjohnso/skin.html

The skin is the largest and the most visible organ of your body. It measures over 19, 000 square centimeters (3,000 square inches). The condition of the skin is an important part of your appearance. Do you know how to keep your skin looking its best? If you understand the structure and function of the skin, then you can apply the basics of proper skin care.

Now, take a look at the structure of the skin and its importance.

The skin has two main layers sitting on top of a layer of fatty tissue. The outer layer is called the EPIDERMIS. The epidermis forms an outer covering that prevents evaporation of body fluids. The epidermis also protects the body from bacteria and other foreign matter.

Under the epidermis is a much thicker layer of cells, the dermis. Located deep in the dermis are the sweat glands. The SWEAT GLANDS help the body excrete waste and control body temperature. The sweat gland collects waste chemicals and mix them with a fluid made in the gland. These chemicals are then secreted as SWEAT. Sweat travels up a twisting tube and leaves the body through a pore.

The skin, together with its accessory organs, constitutes the integumentary system. It is composed of different types of membranes – the serous membranes, mucous membranes, the cutaneous membrane and the synovial membranes.

It functions as a protective covering, aids in regulating body temperature, houses sensory receptor, synthesizes various chemicals, and excretes waste. The skin is composed of an epidermis and a dermis, and has a subcutaneous layer beneath.

The skin is also called the integument, which means “covering” but it is much more than external covering. It plays a key role in a number of body processes. It keeps water and other precious molecules in the body from drying out. It also keeps water like perspiration out.

It is possible for an adult to lose half a liter of water each day through the skin without noticing it.

Does this loss of water through the skin help the body? Yes, it does. This water loss is one way for the body to cool itself. You usually sweat more when the weather is warm. Water moving onto the skin from the sweat glands evaporates, which helps lower the body’s temperature.

You may not think of your skin as a sense organ. It does, however, have many different kinds of nerve cells that detect changes around the body. Each nerve cell detects a different condition. The nerve cells detect pain, pressure, touch, heat and cold. Note that most nerve cells are found in the dermis. Only nerve cells that detect pain are found in both the epidermis and the dermis.

Like messages from other sense organs, messages from the nerve cells in the skin also travel to the brain. There they are decoded as hot, cold, pain, pressure or touch

messages. The sense of touch is located on the skin. Many nerves end at the skin.

The skin provides people with information about their surroundings. The skin, hair, and nails make up the integumentary system.

Try this:

Look at your forefinger. It will show you the marvelous wonders in your body. Notice the flawless skin that covers it. What is found at its tip? Observe the hard structure, the fingernails. Your forefinger is a part of your hand where tiny hair grows out of the skin.

Touch your forefinger. Feel its hardness. Bend it and straighten it.

Parts and Functions

The skin proper is composed of two main layers-the outer layer, called epidermis (*an outermost protective tissue*), and an inner layer or dermis which is thicker subcutaneous region, made up of fatty tissues. The dermis provides insulation and supports reserve of calories in times of need. Both the epidermis and the dermis alert us to tissue injuries, and make us feel the cold air and feel a hug.

Look at the cross section of the skin in Figure 1. Study it carefully and analyze its parts. Can you relate these parts to the functions mentioned earlier?

Exposure of the skin to sunlight stimulates the production of more melanin pigment which results in a tan. The melanin has a protective effect but excessive sun exposure damages the skin, causing leathery skin or worse, skin cancer.

The Epidermis

The epidermis is the outer skin layer. The skin's surface has many ridges and valleys. The ridges are called papillae. The eye can detect small openings in the skin surface called the pores. A pigment called melanin is made in the inner layer of the epidermis.

The Dermis

The dermis connects the epidermis to the underlying tissues. It is composed largely of nerve endings, blood vessels and muscle fibers. Oil glands and sweat glands are found in the dermis. The sebaceous glands found around the hair shafts secrete oil known as **sebum**. Sebaceous glands are found almost everywhere on the surface of the body except on the palms of the hands and the soles of the feet. Sebum moves up through the duct around the hair shaft and out of the pore at the surface the skin. It coats and lubricates the

carotene layer of the epidermis and makes the skin more waterproof. It also helps prevent water loss from the body. Cone-like elevations on the surface of the dermis, or papillae, are the structures that are responsible for fingerprints.

Elastic fibers in the dermis allow for extensibility and elasticity of the skin. There are considerably more elastic fibers in the dermis of the youth than an elderly person. This fact and the disappearance of fat from the subcutaneous layer result in the characteristic wrinkled appearance of the skin in elderly people.

The Subcutaneous layer

The deepest of the skin layer is the subcutaneous. It supplies fat to our body. It insulates the body against heat and cold and also acts as an inner cushion to protect the body against injuries.

What you will do

Activity 1.2

Do you eat pork chop? Which part do you eat? What do you notice about the outer covering? Is it tough? Why it is so? Now, look at the diagram of the human skin and compare its layers to those in the pork chop. Are there similarities?

The hair and nails are structures related to the skin. Both are made of keratin and grow from the epidermal layer of skin.

Hair

Hair is a special structure of the skin. Look at the structure of the hair on the next page. Hair is formed by epidermal cells that line a pocket called follicle, which lies deep within the dermis. The outside layer of the hair and the skin are both composed of transparent keratin cells. If you look at Figure 1, you will see these cells overlap like scales on a fish. When these cells lie flat, they reflect light, giving hair its shine. The melanin pigments give hair as well as skin its color. Whether hair is curly or straight depends on the angle of the hair follicle and the shape of the hair shaft. Curly hair has a flat shaft; straight hair has a round one. Hair fullness depends on the number of shafts and the diameter of each one.

Hair is present on most of the skin surfaces. However, it is most abundant on the scalp. The hair grows from a follicle deep in the dermis. Because the hair that you see is not a living tissue, cutting or shaving the hair has no effect on its growth.

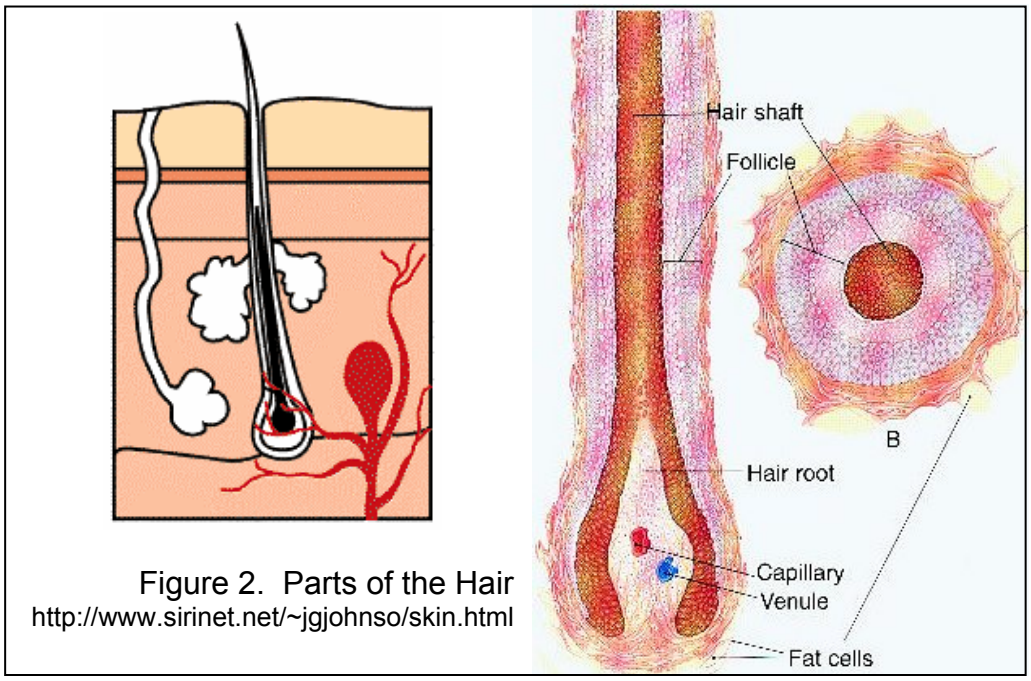


Figure 2. Parts of the Hair
http://www.sirinet.net/~jgjohnso/skin.html

Nails

The nail is another special structure of the skin. To give you a clear idea of how the nail looks like see the illustration below. The hard part of the nail is made of skin tissue. The nail grows from the epidermal cells below it. The skin around the nail forms a hardened margin called the **cuticle**.

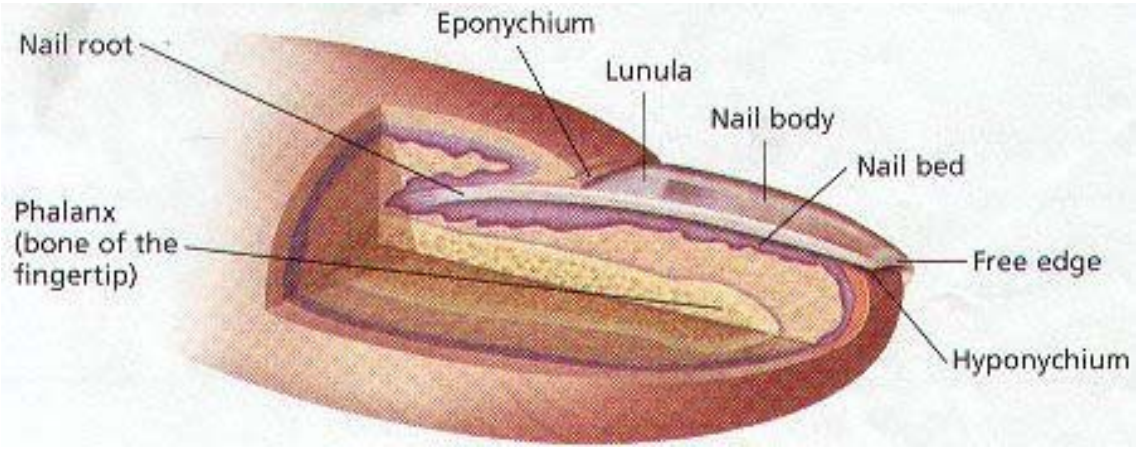


Figure 3. The Parts of a Nail
http//www.sirinet.ml/~jgjohnso/biologyII.html

Fingernails and toenails protect the distal parts of your fingers and toes. The nails are most firmly attached to the base of the nail. This crescent-shaped area is called the **lunula**.

Teeth

Your teeth play an obvious role in appearance. They also have important functions. Teeth are helpful for clear speech. Certain sounds cannot be pronounced without the front teeth. Teeth are also important for grinding food into small particles.

What you will do

Self-Test 1.2

Multiple Choice. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. The waste that comes out of our skin after playing hard is
   a. carbon dioxide
   b. feces
   c. perspiration
   d. urine

2. When we get wet by the rain, we find droplets of rainwater on our skin. This effect is made possible by this gland.
   a. oil
   b. sebaceous
   c. subcutaneous
   d. sweat

3. Which of the following is an important function of the evaporation of perspiration in our body?
   a. responds to body temperature
   b. responds to pressure
   c. responds to sensation to touch
   d. responds to various stimuli

4. When you cut your nails you don't feel pain. This shows that it is
   a. attached to the skin
   b. a dead cell
   c. a part of the skin
   d. a living cell

5. When you pull a strand of your hair from your head it is painful. Why?
   a. The dead part of the hair is found at its tip.
   b. Hair strand secretes oil.
   c. Layers of new hair cells are being pulled
   d. Nerve endings and capillaries are part of the base of the hair.

Key to answers on page 22.

Lesson 2. The Excretory System

Your blood contains many different chemical wastes. Wastes are chemicals that are not needed and maybe harmful. If wastes were not removed from the body, the tissues could fill with poisonous waste products. The wastes could destroy cells and tissues. Fever, poisoning, or even death can result from wastes building up in the tissue.

Wastes are either made by your body cells or are taken into your body as part of your diet. Getting rid of liquid waste is the job of the urinary system. A **urinary system** is made up of those organs that rid the body of liquid waste.

Urea is a waste that results from the breakdown of body protein. It is poisonous and must be removed from the body. Urea is picked up by the blood and carried to the kidneys. The **kidneys** are the most important organs of the urinary system.

The kidneys lie in the small of the back, one on each side of the vertebrae. Each kidney is shaped like a kidney bean. Each kidney is about 10 cm long, 6 cm wide, 2.5 cm thick and has a mass of about 225 grams.

Attached to the kidneys are three tubes - the **renal artery**, the **renal vein**, and the **ureter**. The renal arteries bring blood to the kidneys and the renal veins take it away.

The kidneys clean the blood by removing waste chemicals. These waste chemicals are carried out of the kidneys by the ureter and stored in the bladder as urine. Thus, the function of the kidneys is to clean the blood. The kidneys undertake the following procedures during the cleansing of blood.

1. Blood carrying wastes moves through the body's arteries.
2. Small arteries carry the blood to be filtered into each kidney.
3. The kidneys filter the blood.
4. Blood leaves the kidneys through a vein. The blood is now free of wastes.
5. These veins connect to large veins in the body bringing clean blood to all body parts.
6. Wastes leave the kidneys through the ureters.
7. The **urinary bladder** is a sac that stores wastes removed from the kidneys.
8. The **urethra** is a tube that carries wastes from the urinary bladder outside the body.

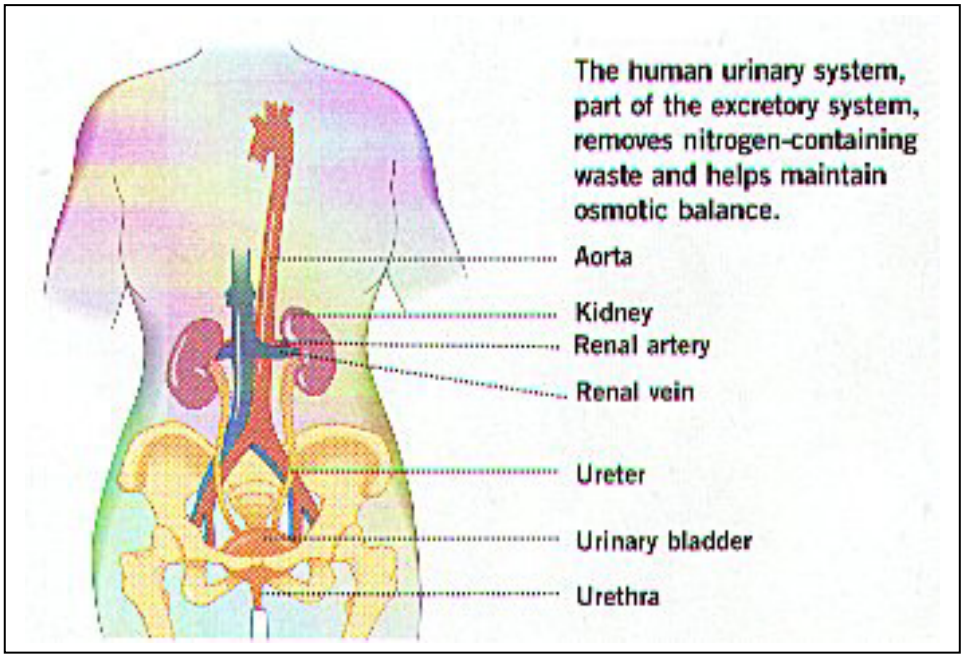


Figure 4. The Urinary System
http://www.sirinet.net/~jgjohnso/urinary.html

The urinary system shown above is composed of two kidneys, one urinary bladder, two tubes called **ureters**, and another tube called the **urethra**.

You probably know that the kidneys filter blood, so it is no surprise that there are a couple of blood vessels attached directly to each kidney. The full names of these blood vessels are the **renal artery** and the **renal vein**.

Three of the four major metabolic wastes produced by the body are filtered from the blood by the kidneys. Any idea which ones? They are water, salts, and urea (the fourth, carbon dioxide, is excreted by the lungs, remember?).

These are the same three wastes that sweat glands filter and excrete. So, sweat and urine are made basically from the same ingredients (except in different concentrations).

Microscopic filtering units in the kidneys called **NEPHRONS** (Figure 5) remove wastes from the blood. There are approximately one million nephrons in each kidney. The kidneys take all of the blood out of the bloodstream, clean it and then return it to the bloodstream minus the waste products.

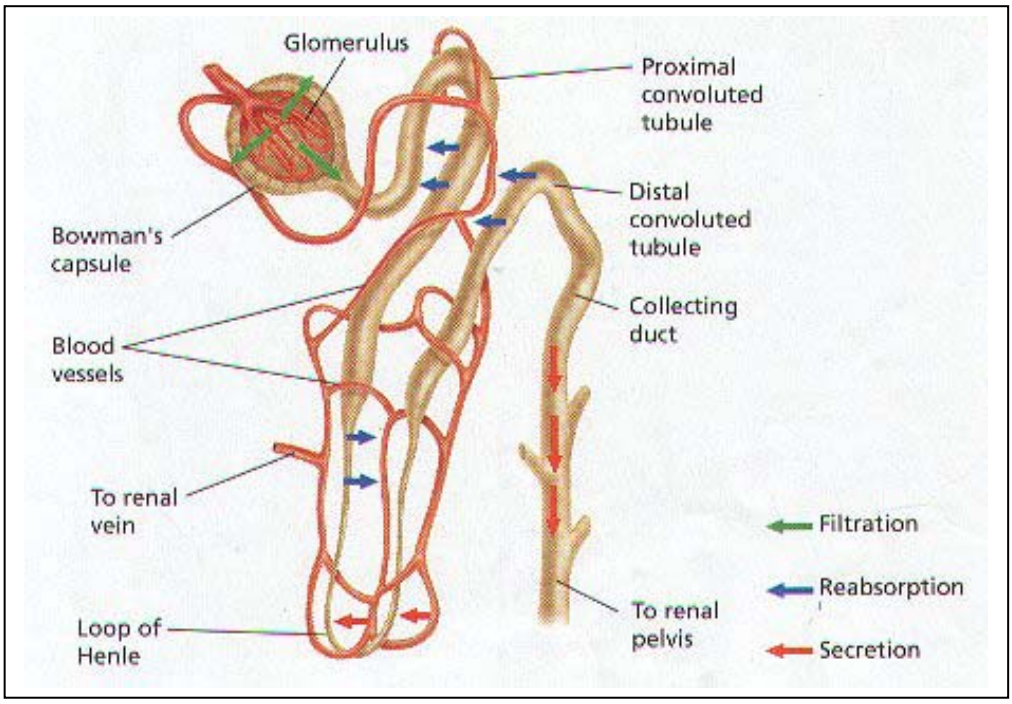


Figure 5. The Nephron
http://www.sirinet.net/~jgjohnso/urinary.html

Your kidneys clean all the blood in your body every thirty minutes. In one day that totals 200 liters of blood, from which 2 liters of urine are produced. Without your kidneys, you would poison yourself rapidly.

A large amount of the water your body needs comes from the foods you eat and the liquids you drink. Water is lost through the skin as perspiration, from the lungs in exhaling, from the kidneys as urine, and from the large intestine in feces. Therefore, adequate fluid intake, at least eight or ten glasses a day, everyday, is necessary.

Did you notice that cold weather and nervous tension promote urine flow? The amount of urine flow also varies with how much fluid you drink. Some substances called **diuretics** stimulate urine flow. Caffeine and alcohol are examples of diuretics.

What you will do

Self-Test 2.1

Answer the following questions:

1. Where are the kidneys located?
2. Name the three tubes attached to the kidneys and tell what flows through each.
3. Where are the wastes from the kidneys stored and in what form are they stored?

4. What is the function of the kidneys?
5. How do the excretory system and the integumentary system work together?

Key to answers on page 22.

Excretion through the Lungs

Although the lungs are part of the respiratory system, they also rid the body of wastes. They help in getting rid of unneeded carbon dioxide. Lungs also help in ridding the body of water and excess heat. You lose water each time you breathe out. If you exhale on a cold day, the "breath" you can see is water from your lungs forming in the air.

Excretion through the Large Intestine

The colon or large intestine is about 1.5 to 1.8 meters (5 to 6 ft.) long and 5 centimeters (2 inches) in diameter. Indigestible matter or wastes enter it from the small intestine in a watery mixture and spends about 4 hours here. When the contents enter the rectum, they have become nearly solid because of water absorption. The feces in the rectum are held by sphincter muscle until they are discharged through the anus.

Excretion and homeostasis

The main function of the integumentary and excretory system is to excrete waste. The integumentary system does it by excreting sweat, and the excretory system does it by excreting urine.

The integumentary and the excretory system also help the body to maintain **homeostasis**. The word *homeostasis* comes from the Greek word *homoio*, which means "the same" or "constant".

The integumentary system and the excretory system each help the body to maintain homeostasis in a different way. The integumentary system helps keep the body at a constant temperature. The excretory system helps keep the body fluids at a constant level.

In summary, the integumentary and excretory systems help the body maintain certain activities at a constant level, or at, homeostasis.

What you will do

Self-Test 2.2

1. Define homeostasis.
2. Name one way by which the integumentary system helps the body maintain homeostasis.
3. Name one way by which the excretory system helps the body maintain homeostasis.

Key to answers on page 22.

Before we end this module, remember that:

INTEGUMENTARY SYSTEM	→	*Collects chemical wastes and excretes sweat.*

EXCRETORY SYSTEM	→	*The KIDNEYS filter blood and excrete wastes as URINE.*

Lesson 3. Problems of the Integumentary and Excretory Systems

Problems of the Integumentary System

There are problems of the skin you should be familiar with. Many of these diseases are of unknown origin and as a result treatment is done only to relieve the symptoms. Fortunately, although the disease of the integumentary system causes discomfort, most of them are self-limiting.

One of the most common symptoms associated with diseases of the skin is itching. Excessive warmth, rough fabrics and emotional stress add more to itching. Itching is more noticeable at night, probably because you are not preoccupied with something else.

Are you bothered by skin problems? Skin problems are among the most common complaints of teenagers and adults like you. Proper care can help correct various skin problems.

Have you experienced having acne? If so, at what age did this occur? What did you do to overcome the problem?

Acne. It is one of the most common problems of the integumentary system. This occurs during adolescence and usually it is self-limiting. It will disappear in the late teens or early twenties. However, 8-10 years is a long time for a young person who longs to be attractive and popular to endure the pimples and blackheads of acne. During adolescence, sex glands increase the secretion of hormones, which produce many body changes. There is a noticeable growth spurt and an increase in body hair. A child's figure changes into that of an adult. At the same time, these hormones stimulate the oil glands to produce more sebum. This extra oil causes the acne problem.

Frequent and thorough washing of the affected areas with a mild soap is helpful because it helps reduce oiliness and the number of bacteria causing the infections on the skin.

Have you seen white flakes coming out of the scalp of some people while brushing their hair? These are called dandruff.

Dandruff. Dandruff or white flakes on the head is characterized by oily scalp, itching and irritation. If one has dandruff, this may cause the premature loss of hair. Dandruff can be lessened through frequent shampooing (two or three times a week), brushing the hair and massaging the scalp.

Lice (pediculosis). Also attached to the hair of some persons are nits and head lice. Lice and nits are carried easily from one person to another through direct body contact or through the use of infected articles, such as clothes, blankets and combs. Special shampoos must be applied to kill the lice. Fine combs can also be used to pull nits off the hair.

Ringworm. This is caused by skin fungus. Its name comes from the distinct, raised circular areas that characterize the infection. These areas are caused by a fungus growth in the scalp tissues. As the fungus spreads, spotty and ragged bald spots appear on the scalp. Ringworm can also infect the face, neck, and other areas. Scratching the infected area generally spreads the infection. Washing with soap and water and then thoroughly drying the area also prevents the growth of ringworms.

Do you know why the exchange of items that make contact with the head like scarf's and combs are not allowed in some establishments? This is because they would like to prevent the spread of ringworm which is a contagious scalp infection.

Eczema. It is characterized by vesicles (blister) on reddened itchy skin. The blisters burst and white fluid comes out of them; crusts form later from the dried fluid. This is usually aggravated by emotional stress. Starch baths may relieve some of the symptoms.

Warts. Warts appear as raised growths on the skin. Warts are caused by a virus that can be picked up anywhere. Warts can grow anywhere but are most common on the

face and hands. Warts can spread from one person to another, or from one area to another on the same person's body.

Prickly Heat. It is a rash of bright red pimples usually contracted during hot weather. The discomfort of prickly heat may be relieved by cool baths using mild soap. The person should apply a light coat of starch powder.

Many babies suffer from prickly heat during the summer months when the weather is hot.

Athlete's Foot. It is caused by a fungus infection. This affects the skin between the toes; the skin is red, cracked and sore. The infectious may spread to other parts of the feet, the hands, axillae and the groin. Because it is infectious, care must be taken to avoid transmission from one person to another by means of contaminated towels and other toilet articles. This disease is common among athletes who do not wear footwears when playing. Also, laundry women are affected by said disease.

Corns and Calluses. They are usually the result of friction caused by poorly fitted shoes. Corns are hard, raised areas that are often painful. Calluses are flat, thickened patches. The only effective treatment is to relieve the pressure of friction. Rubbing cream may soften the areas.

What you will do

Activity 3.1 Survey on Skin Diseases

Using your knowledge about the nature of the different skin diseases, conduct a mini survey among l5 people and find out if they have any one of these skin diseases. Record your findings on a piece of paper and ask them how they solve their respective problems.

Excretory Problems

The kidneys may become diseased. They are often damaged if a person has high blood pressure. Another cause of damage may be kidney infection caused by bacteria.

Humans are rather lucky in that they can live with only one kidney. Thus, if one kidney is damaged, you still have one to help with the excretion. But what happens when both kidneys are damaged? In cases like this, a kidney transplant may be undertaken.

Some of the most common disorders of the urinary system are urinary tract infections, kidney obstructions, kidney stones, and strictures. Kidney obstructions may be caused by tumors, cysts, and stones. If this is not corrected it can damage the kidney.

Calculi or Kidney Stones. Kidney stones develop from various minerals like calcium compounds and nitrogen-containing waste products that are present in the food you eat. The stone can be small and numerous like gravel. Small stones can pass through the ureter to the bladder. This usually causes extreme pain across the back, down the ureter and into the thigh. When the ureter is completely blocked by a large stone it causes urine to back up into the kidney. If the stone is not removed or dissolved, it can lead to complete destruction of the kidney. Stone formation is caused by any condition that leads to the formation of salts in urine.

Urinary Tract Infections. The urinary bladder can be infected by bacteria entering the urethra. Some symptoms are frequent and painful elimination of small amounts of urine containing pus, pain over the lower abdomen, fever and chills. Bladder infections are more common among women than among men. This is due to a shorter urethra, which provides less protection for the bladder against bacteria.

Strictures. These are bands of fibrous tissue that reduce the circumference of the urethra or ureter. They may be caused by infection or trauma. Have you experienced burning sensation while urinating, a slow stream of urine, frequency of urination or difficulty removing? If so, these are some of the symptoms.

Are you fond of eating salty foods? Do you often use “patis”? These practices lead to stone formation. Others are prolonged bed rest or inactivity.

Drinking plenty of water and other juices, exercise and avoiding salty foods will help maintain a healthy urinary system.

Challenge!

Do you drink buko juice? Did you notice how often you urinate after drinking buko juice? This frequent urination helps clean your kidneys. Can you think of other ways by which you can clean the kidneys?

Let's Summarize

1. Most of the chemical waste products come from the processing of proteins.
2. Excretion is the process by which a person gets rid of wastes.
3. The major organs that excrete chemical wastes are the skin and the kidneys.
4. Some functions of the skin are to excrete chemical wastes, maintain fluid balance, maintain a constant temperature, and provide the brain with information.
5. The sweat glands help excrete waste chemicals and control body temperature.
6. The kidneys clean the blood.

7. The kidneys are the main excretory organs of the body.
8. Microscopic filtering units in the kidneys, called nephrons, remove waste from the blood.
9. The kidneys filter waste from the blood and excrete its urine.
10. The functions of the integumentary and excretory systems are to excrete waste and help maintain homeostasis.
11. Acne, dandruff, eczema, prickly heat, athlete's foot, corns and calluses, and ringworm are some of the common problems of the skin.
12. Some excretory problems are kidney obstructions, stones, strictures and cystitis.

Posttest

Multiple Choice. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. The excretory organ that eliminates carbon dioxide is/are the
   a. large intestine
   b. liver
   c. lungs
   d. skin

2. The main excretory organ of the body is/are the
   a. kidneys
   b. large intestine
   c. lungs
   d. skin

3. The amount of blood that is filtered by the kidneys each day is
   a. 100 liters
   b. 200 liters
   c. 300 liters
   d. 400 liters

4. About how many liters of urine is produced by the kidneys if 200 liters of blood is filtered?
   a. 2
   b. 3
   c. 4
   d. 5

5. All of the organs below make up the integumentary system **except**:
   a. hair
   b. kidneys
   c. skin
   d. toe nails

6. The true location of the kidney is
   a. one on each side of the hips
   b. one on each side of the pelvis
   c. one on each side of the ribs
   d. one on each side of the vertebrae

7. Two of the body wastes below are classified as chemical wastes. These are
   a. feces and carbon dioxide
   b. sweat and carbon dioxide
   c. sweat and urine
   d. urine and carbon dioxide

8. The organ that removes solid waste is/are the
    a. large intestine
    b. liver
    c. lungs
    d. skin

9. The gaseous waste expelled by the lungs is
    a. carbon dioxide
    b. hydrogen
    c. nitrogen
    d. oxygen

10. All of these are body wastes **except**:
    a. carbon dioxide
    b. garbage
    c. perspiration
    d. urine

11. Sweat leaves the human body through
    a. dead cell
    b. hair
    c. pore
    d. wound

12. Which organ serves as storage of urine?
    a. renal artery
    b. renal vein
    c. ureter
    d. urinary bladder

13. What organ serves <u>both</u> as an excretory as well as a reproductive organ?
    c. renal artery
    d. ureter
    c. urethra
    d. urinary bladder

14. What do you call the removal of wastes in the body?
    a. breathing
    b. defecation
    c. excretion
    d. micturation

15. The kidneys clean the blood in the body once every _____.
    a. 20 min.
    b. 30 min.
    c. 40 min.
    d. 50 min.

16. Homeostasis is a function of both the integumentary and excretory systems. The integumentary do this by:
    a. keeping the body at a constant temperature
    b. keeping the body fluids at a constant level
    c. keeping the body from harm
    d. keeping the body healthy

17. What are the main functions of both the integumentary and excretory system?
    a. absorb waste and maintain homeostasis
    b. excrete wastes and maintain homeostasis
    c. provide brain information
    d. maintain body's balance

18. The inner layer of the skin is the
    a. dermis
    b. epidermis
    c. sebaceous
    d. subcutaneous

19. On which layer do we find cone like elevations responsible for fingerprints?
    a. dermis
    b. epidermis
    c. sebaceous
    d. subcutaneous

20. Which of these protects us from harm and contains nerve endings that respond to different sensations?
    a. large intestine
    b. liver
    c. lungs
    d. skin

Key to answers on page 22.

Key to Answers

Pretest

I.			II.
1. c	6. b	11. b	1. hair
2. b	7. c	12. d	2. nerves
3. a	8. d	13. a	3. epidermis
4. b	9. b	14. c	4. dermis
5. a	10. c	15. d	5. subcutaneous layer

Lesson 1

Self-Test 1.1

Type	Example	System used
Gaseous wastes	carbon dioxide	respiratory
Solid wastes	feces	digestive
Chemical wastes	nitrogen	excretory

1. gaseous, solid , chemical
2. nitrogen
3. they are poisonous
4. skin, kidneys – integumentary, urinary

Self-Test 1.2

1. c
2. a
3. a
4. b
5. d

Lesson 2

Self-Test 2.1

1. on each side of the vertebrae.
2. 2 ureters, urethra - urine
3. urinary bladder, liquid
4. blood is cleanse and waste chemicals are removed.
5. maintain homeostasis.

Self-Test 2.2

1. Constant or the same.
2. Integumentary system keeps the body at constant temperature.
3. Excretory system keeps the body fluids at constant level.

Post-Test

1. c	6. d	11. c	16. a
2. a	7. c	12. d	17. b
3. b	8. a	13. c	18. a
4. a	9. a	14. c	19. a
5. b	10. b	15. b	20. d

References

Books:

Daniel, L. (1994). *Life science*. Westerville, OH: Merill Publishing Co., Mcmillan/McGraw-Hill.

Grabowski, T. (2003). *Principles of anatomy and physiology*. NY: John Wiley and Sons, Inc.

Holo, W. (1984). *Human anatomy and physiology*. (3rd Ed.) Dubuque, Iowa: W. C. Brown Publishers.

Hopson, J.L. & Wessells, N.K. (1990). *Essentials of biology*. USA: McGraw-Hill Publishing Company.

Kaskel, A., Hummer, P.J. & Daniel, L. (1981). *Biology on everyday experience.* USA: Merill Publishing Co.

Mariele, E.N. (1998). *Essentials of human anatomy and psychology*. (3rd Ed.) USA: Addison- Wesley Longman, Inc.

Payne, H. (1995). *Understanding your health*. St Louis, Missouiri: Mosby Publishing Company.

Pikering, W.H. (2000). *Complete biology*. New York: Oxford University Press

Wong, H.K. & Dolmatz, S. (1986). *Biology: The key ideas*. New Jersey: Prentice – Hall, Inc. Eaglewood Cliffs.

Electronic Sources:

Retrieved January 10, 2005 htttp//www4.tpgi.com.au/users/amcgann/body/html

Retrieved January 10, 2005 from http//www.innerbody.com

Retrieved January 10, 2005 from http/www.bartleby.com

Retrieved January 10, 2005 from http//www.sirinet.ml/~jgjohnso/biologyII.