The blood vessels circulate the blood through two major circulatory systems:

1. **Cardiopulmonary circulation**—blood from the heart to the lungs and back to the heart.
2. **Systemic circulation**—blood from the heart to the tissues and cells and back to the heart.

Specialized systemic routes are as follows:

1. **Coronary circulation**—brings blood from the heart to the myocardium.
2. **Portal circulation**—takes blood from the organs of digestion to the liver through the portal vein.
3. **Fetal circulation**—only occurs in the pregnant female. The fetus obtains oxygen and nutrients from the mother’s blood.

### CARDIOPULMONARY CIRCULATION

Cardiopulmonary circulation takes deoxygenated blood from the heart to the lungs where carbon dioxide is exchanged for oxygen. The oxygenated blood returns to the heart. As stated in Chapter 13, blood enters the right atrium, which contracts, forcing the blood through the tricuspid valve into the right ventricle.

The right ventricle contracts to pump the blood through the pulmonary valve into the pulmonary trunk. The pulmonary trunk bifurcates (divides in two). It branches into the right pulmonary artery, bringing blood to the right lung, and into the left pulmonary artery, bringing blood to the left lung, Figure 14–1.

Inside the lungs, the pulmonary arteries branch into countless small arteries called arterioles. The arterioles connect to dense beds of capillaries lying in the alveoli lung tissue. Here, gaseous exchange takes place: Carbon dioxide leaves the red blood cells and is discharged into the air in the alveoli, to be excreted from the lungs. Oxygen from air in the alveoli combines with hemoglobin in the red blood cells. From these capillaries the blood travels into small veins or venules, Figure 14–2.

Venules from the right and left lung form large pulmonary veins. These veins carry oxygenated blood from the lungs back to the heart and into the left atrium.

The left atrium contracts, sending the blood through the bicuspid, or mitral, valve into the left ventricle. This chamber, then, acts as a pump for newly oxygenated blood. When the left ventricle contracts, it sends oxygenated blood through the aortic semilunar valve, then into the aorta.

### SYSTEMIC CIRCULATION

The function of the general (systemic) circulation is fourfold: it circulates nutrients, oxygen, water, and secretions to the tissues and back to the heart; it carries products such as carbon dioxide and other dissolved wastes away from the tissues; it helps equalize body temperature; it aids in protecting the body from harmful bacteria.

The **aorta** is the largest artery in the body. The first branch of the aorta is the **coronary artery** which takes blood to the myocardium (cardiac muscle). As the aorta emerges (ascending aorta) from the anterior (upper) portion of the heart, it forms an arch. This arch is known as the aortic arch. Three branches come from this arch: the brachiocephalic, the left common carotid, and the left subclavian arteries. Figure 14–3. These arteries and their branches carry blood to the arms, neck, and head.

From the aortic arch, the aorta descends along the mid-dorsal wall of the thorax and abdomen. Many arteries branch off from the descending aorta, carrying oxygenated blood throughout the body.

As the descending aorta proceeds posteriorly, it sends off additional branches to the body wall, stomach, intestines, liver, pancreas, spleen, kidneys, reproductive organs, urinary bladder, legs, and so forth. Each of these arteries subdivides into still smaller arteries, then into arteri-oles, and finally into numerous capillaries embedded in the tissues. This is where hormones, nutrients, oxygen, and other materials are transferred from the blood into the tissue.

In turn, metabolic waste products, such as carbon dioxide and nitrogenous wastes, are picked up by the blood capillaries. Hormones and nutrients from the small intestines and liver, are also absorbed by the blood capillaries. Blood goes from the capillaries first into tiny veins, through increasingly larger veins, and finally into one (or more) of the veins which exit from the organism. Eventually it empties into one of two largest veins in the body. See Figure 14–3.

Deoxygenated venous blood, returning from the lower parts of the body, empties into the inferior vena cava. Venous blood from the upper body parts (arms, neck, and head) passes into the superior vena cava. Both the inferior and superior veins...
cava empty their deoxygenated blood into the right atrium.

**Coronary Circulation**

The coronary circulation brings oxygenated blood to the heart muscle. The coronary artery has a right and left branch. These branches encircle the heart muscle with many tiny branches going to all parts of the heart muscle. The blood circulates to the capillaries where the exchange of gases takes place, and then goes to the veins. Deoxygenated blood returns through the coronary veins to the coronary sinus. This is a trough in the posterior wall of the right atrium.

**Portal Circulation**

The portal circulation is a branch of the general circulation. Veins from the pancreas, stomach, small intestine, colon, and spleen empty their blood into the portal vein which goes to the liver (see Figure 14-4). After meals, blood reaching the liver contains a higher than normal concentration of glucose. The liver removes the excess glucose, converting it to glycogen. In the event of vigorous exercise, work or prolonged periods without nourishment, glycogen reserves will be changed back into glucose for energy. The liver ensures that the blood’s glucose concentration is kept within a relatively narrow range.

**Fetal Circulation**

Fetal circulation occurs in the fetus (unborn baby). Instead of using its own lungs and digestive system, the fetus obtains oxygen and nutrients from the mother’s blood. The fetal and maternal blood do not mix. The exchange of gases, food, and waste takes place in the structure known as the placenta, located in the pregnant uterus.

In fetal circulation, blood may follow two paths: In the fetal heart there is an opening in the septum called the foramen ovale, which permits blood to flow from the right atrium to the left atrium, and/or blood may go from the right ventricle to the pulmonary semilunar valve to the pulmonary artery. Another fetal structure, called the ductus arteriosus, allows the blood to flow from the pulmonary artery to the aorta.
in a fetus, the purpose of the blood circulating through the heart is to give the heart and blood vessels oxygen and nutrients to grow. When birth occurs, the foramen ovale closes and the ductus arteriosus collapses and the normal cardiovascular circulation begins.

BLOOD VESSELS

The heart pumps the blood to all parts of the body through a remarkable system of three types of blood vessels: arteries, capillaries, and veins.

Arteries

Arteries carry oxygenated blood away from the heart to the capillaries. (There is one exception—the pulmonary arteries—which carry deoxygenated blood from the heart to the lungs). The arteries transport blood under very high pressure; they are elastic, muscular, and thick walled. The thickness of the arteries makes them the strongest of the three types of blood vessels. Table 14-1 lists the principal arteries and the areas they serve. See also Figure 14-5.

As seen in Figure 14-6, the arterial walls consist of three layers: The outer layer is called the tunica adventitia or externa. This layer consists of fibrous connective tissue with bundles of smooth muscle cells which lend great elasticity to the arteries. The tunica media is the middle arterial layer. It consists of muscle cells arranged in a circular pattern. This layer controls the artery’s diameter by distention and constriction, which regulates the flow of blood through the artery. This keeps the blood flow steady and even and reduces the heart’s work.

An inner layer (tunica intima) consists of three smaller layers: endothelium, atheroma, and elastic tissue. The endothelium gives the artery a smooth lining which allows for the free flow of blood. See Figure 14-6.

The aorta leads away from the heart and branches into smaller arteries. These smaller arteries, in turn, branch into arterioles, which still

Figure 14-5 Arterial distribution
Although capillaries are ultimately responsible for transporting blood to all tissues, not all capillaries are open simultaneously. This system allows for regulation of blood flow to so-called active tissues. In the human brain, for instance, most of the capillaries remain open; however, in a resting muscle, only 1/20 to 1/50 of the capillaries transport blood to the muscle cells. Compare this with an actively contracting muscle where as many as 190 capillaries per square millimeter are open. If the same muscle is not active, there may be as few as 5 capillaries open per square millimeter.

**Veins**

The veins carry deoxygenated blood away from the capillaries to the heart. The smallest vein is hardly larger than a capillary, but it contains a muscular layer which is not present within capillaries. Table 14-1 lists the principal veins and the areas they serve. See also Figure 14-7.

The veins are composed of three layers: the tunica externa, tunica media, and tunica intima. Veins are considerably less elastic and muscular than arteries. The walls of the veins are much thinner than those of the arteries, because they do not have to withstand such high internal pressures. The pressure from the heart’s contraction is greatly diminished by the time the blood reaches the veins for its return journey. Thus the thinner walled veins can collapse easily when not filled with blood. Finally, veins have valves along their length. These valves allow blood to flow only in one direction—toward the heart. This prevents reflux (backflow) of blood toward the capillaries. Figure 14-8. Valves are found in abundance in veins where there is a greater chance of reflux. There are many valves in the lower extremities where blood has to oppose the force of gravity.

Eventually, all the veins converge to make up larger veins, which ultimately form the body’s largest veins, the vena cavae. Venous blood from the upper part of the body returns to the right atrium via the superior vena cava; blood from the lower body parts is conducted to the heart via the inferior vena cava.
**VENOUS RETURN**

In addition to valves, the skeletal muscles contract to help push the blood along its path. In the abdominal and thoracic cavity, pressure changes occur when you breathe; this also helps to bring the venous blood back to the heart. Think about sitting for a long period of time, especially on a car ride. Think how sleepy you start to get. The reason may be that blood is not getting back to the heart for oxygen. To reduce the drowsiness, you should pull over, and stop the car, and get out and walk around for a while. This will improve circulation and the drowsiness should pass.

**BLOOD PRESSURE**

When the heart pumps blood into the arteries, the surge of blood filling the vessels creates pressure against their walls. The pressure measured at the moment of contraction is the systolic blood pressure. The lessened force of the blood (measured when the ventricles are relaxed) is called diastolic pressure. The pressure in arteries that are closest to the heart is greatest and gradually decreases as the blood travels further away from the heart.

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**Table 14-2 Principal Veins**

<table>
<thead>
<tr>
<th>Principal Vessels</th>
<th>Areas Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior vena cava</td>
<td>Head, neck, upper extremities, thoracic cavity, liver, spleen</td>
</tr>
<tr>
<td>Inferior vena cava</td>
<td>Lower extremities, pelvis, lower abdomen</td>
</tr>
<tr>
<td>Azygos vein</td>
<td>Thoracic cavity, liver, spleen</td>
</tr>
<tr>
<td>Inferior cava</td>
<td>Lower extremities, pelvis, lower abdomen</td>
</tr>
<tr>
<td>Vena cava</td>
<td>Thoracic cavity, liver, spleen</td>
</tr>
</tbody>
</table>

---

**Figure 14-8 Valves in the veins**

The average systolic pressure measured in the upper arm in an adult is 120 mm Hg. The average diastolic pressure in an adult is 80 mm Hg. The blood pressure is recorded as 120/80. Pulse pressure, a term associated with blood pressure, is the difference between the systolic and diastolic; if blood pressure is 120/80, the pulse pressure is 40.

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**Figure 14-7 Venous distention**

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**Figure 14-6** Blood flow toward the heart.

**Figure 14-5** Valve open to allow for venous blood flow.

**Figure 14-4** Valve closed to prevent venous back flow.
Effects of Aging

The Circulation
and Blood Vessels

The arteries that are pliable and elastic when young become less elastic, dilated, and elongated with age. These physiological changes mean the heart has to work harder to push blood through the less elastic arteries. Overall, arterial changes appear to be widespread and result in a diminished circulation to all organs and tissues.

A frequent cardiovascular measure is blood pressure. It is debatable how aging affects this measure of cardiovascular status. Some researchers believe normal B.P. for older persons is typically 140/90 systolic and 90 diastolic (140/90).

Some researchers think that systolic increases are due to aortic elastically, whereas others believe that peripheral resistance in the vessels causes an increase in both systolic and diastolic.

The baroreceptors in the carotid arteries (nerve receptors sensitive to blood pressure) become rigid and less sensitive to pressure changes with aging. This results in a slow response to posture changes. Changes in position may cause dizziness and fainting. This hypotensive response is called orthostatic hypotension.

Figure 14-9 Pulse points/pressure points

locations where you can conveniently feel your pulse are as follows (see Figure 14-9):

1. Brachial artery—located at the crook of the elbow, along the inner border of the biceps muscle
2. Common carotid artery—found in the neck, along the front margin of the sternocleidomastoid muscle, near the lower edge of the thyroid cartilage
3. Femoral artery—in the inguinal or groin area
4. Dorsalis pedis artery—on the anterior surface of the foot, below the ankle joint
5. Popliteal artery—behind the knee; may be hard to palpate
6. Radial artery—at the wrist, on the same side as the thumb
7. Temporal artery—slightly above the outer edge of the eye

Career Profile

Nursing Aides and Psychiatric Aides

Nursing aides and psychiatric aides help care for people who are physically or mentally ill, injured, disabled, or confined to hospitals, nursing, or residential care facilities.

Nursing aides work under the supervision of nursing and medical staff. They answer calls, deliver messages, serve meals, make beds, and help patients to eat, dress, and bathe. Aides may also provide skin care, take vital signs, and assist patients in and out of bed. They observe patients' physical, mental, and emotional states and report any changes to the nursing or medical staff. Nursing aides employed in nursing homes are often the principal caregiver, having far more contact with the residents than other staff members.

Psychiatric aides care for the mentally impaired and work under a health care team. In addition to helping patients with the activities of daily living, they socialize with the patients and lead them in educational and recreational activities. Because they have the closest contact with the patients, psychiatric aides have a great deal of influence on patients' outlook and treatment.

Most states require a nursing aide to have training. Nursing aides employed in the nursing homes must complete a minimum of 70 hours of mandatory training and pass a competency examination within 4 months of employment. Aides who complete the course are placed on the state registry of nursing aides.

In response to the aging population, job outlook is good and is expected to grow faster than the average.

A pressure point is where the main artery to the injured part lies near the skin surface over a bone. The seven locations where you can feel your pulse may also serve as pressure points. If direct pressure cannot be applied to a wound to stop bleeding, pressure should be applied to the closest pulse point.

CONGENITAL HEART DEFECTS

Congenital heart defects occur when there is a malformation of the heart during fetal development. In addition to malformation, other conditions may exist because of the unique structure of the fetal heart. As mentioned in fetal circulation, when the baby is born the lungs begin to function, the foramen ovale closes, and the ductus arteriosus collapses. If this does not occur, proper oxygenation will not occur. The most common symptom of heart disease is cyanosis, which is a bluish disfigurement to the skin and mucous membrane. Microsurgical surgery today can be used to correct many congenital heart defects.

DISORDERS OF BLOOD VESSELS

Aneurysm is the balloon out of an artery, accompanied by a thinning arterial wall, caused by a weakening of the blood vessel (almost like having a
LICENSED PRACTICAL NURSES

Licensed practical nurses (LPNs) or licensed vocational nurses (LVNs) (as they are called in Texas and California) care for people who are sick, injured, convalescing, and handicapped under the direction of a physician or registered nurse. Most LPNs provide basic bedside care. They take vital signs, treat bedsores, prepare and give injections, and administer some treatments. They collect laboratory specimens, observe patients, and report any adverse reactions. They help patients with activities of daily living, keep them comfortable, and care for their emotional needs. In nursing homes, they may administer prescribed medications.

LPNs in nursing homes also evaluate residents' needs, develop care plans, and supervise nursing aides. All states require LPNs to graduate from an accredited practical nursing program and pass a national licensing examination.

Job outlook for the practical nurse is good and is expected to increase faster than the average over the next few years.

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**Figure 14-10** Arteries affected by and resulting complications of atherosclerosis

**AFFECTED SITE**

- Cerebral arteries
- Carotid arteries
- Aorta
- Coronary arteries
- Renal arteries
- Iliac arteries
- Femoral arteries
- Tibial arteries

**COMPLICATION**

- Stroke, transient ischemic attacks, chronic ischemic brain disease
- Angina, myocardial infarction
- Hypertension
- Peripheral vascular disease

---

**Figure 14-10** Arteries affected by and resulting complications of atherosclerosis

- Bubble on a tire. The aneurysm pulsates with each systolic beat. The symptoms include pain and pressure. Sometimes there are no symptoms. The most common aneurysm site is the aorta.

- Atherosclerosis is the disease that occurs when the arterial walls thicken because of a loss of elasticity as aging occurs. Atherosclerosis is the disease that occurs when deposits of fatty substances form along the walls of the arteries. See Chapter 13, Exercise, low-fat diet, and cholesterol-lowering drugs are recommended to prevent this disease. In both arteriosclerosis and atherosclerosis, there is a narrowing of the blood vessel opening. This interferes with the blood supply to the body parts and causes hypertension. Symptoms develop where the circulation is impaired (numbness and tingling of the lower extremities or loss of memory indicates interference with circulation). See Figure 14-10.

- Gangrene is death of body tissue due to an insufficient blood supply caused by disease or injury.

- Phlebitis is an inflammation of the lining of a vein, accompanied by clotting of blood in the vein. Symptoms include edema (swelling) of the affected area, pain, and redness along the length of the vein.

- Embolism is a traveling blood clot. A pulmonary embolism is a blood clot in the lungs.

- Varicose veins are the swollen veins that result from a slowing of blood flow back to the heart, Figure 14-11. Blood backs up in the veins if the muscles do not massage them. The weight of the stagnant blood distends the valves; the continued pooling of blood then causes distention and inelasticity of the vein walls. This condition develops due to hereditary weakness in vein structure. In addition the human posture, prolonged periods of standing, and physical exertion can cause valves in the superficial leg veins to enlarge and weaken. Age and pregnancy are other factors responsible for varicose veins.

- Hemorrhoids are varicose veins in the walls of the lower rectum and the tissues around the anus.

- Cerebral hemorrhage refers to bleeding from blood vessels within the brain. It can be caused by arteriosclerosis, disease, or injury, such as a blow to the head.

- Peripheral vascular disease is caused by blockage of the arteries, usually in the legs. Symptoms are pain or cramping in the legs or buttocks while walking. This pain is called claudication. As the condition worsens, symptoms may include pain in the toes or feet while at rest, numbness, pallor, and cyanosis in the foot or leg. The condition must be treated or amputation may be necessary. Treatments include medication to reduce cholesterol, improved and/or modified diet, and other treatments to improve circulation.

- Hypertension or high blood pressure is frequently called the "silent killer," because there are usually no symptoms of the disease. This condition leads to strokes, heart attacks, and kidney failure. Most people discover that they have the condition during a routine physical. Hypertension means that blood pressure is 140/90 or higher.
One in five Americans has hypertension. Incidence of hypertension is higher in black Americans and postmenopausal women. Risk factors for hypertension are stress, smoking, overweight, diet high in fat, and a family history of the disease. Treatment consists of relaxation techniques, reducing fat in the diet, exercise, weight loss, and medication to control blood pressure. In the treatment of hypertension, patients do not understand the disease and its risks. They frequently stop taking their medication because of costs and side effects. Health care workers must realize that better education and communication will lead to more effective treatment and a higher level of compliance by patients.

Hypertension is low blood pressure; usually, the systolic reading is under 100 mm Hg.

Transient ischemic attacks (TIAs) are temporary interruptions of the blood flow (ischemia) to the brain. The cause is usually a narrowing of the carotid artery due to an accumulation of fat. Patients may experience stroke-like symptoms such as dizziness, weakness, or temporary paralysis which last less than 24 hours. About 50% of people who have TIAs have a major stroke within the following year.

Cerebral vascular accident (CVA) or stroke is the sudden interruption of the blood supply to the brain. This results in a loss of oxygen to brain cells causing impairment of the brain tissue and/or death. Figure 14-12: Stroke is the third leading cause of death in the United States. Based on statistics from the American Heart Association, about 730,000 Americans are affected per year with about 160,000 resulting in death.

Risk factors include smoking, hypertension, heart disease, and family history. About 90% of strokes are caused by blood clots. The clot becomes lodged in the carotid arteries, choking off the blood supply to the brain. The remaining 10% of strokes called hemorrhagic strokes are caused when blood vessels within the brain rupture.

Symptoms depend on which side of the brain has its blood supply interrupted. Loss of blood supply to the right cerebrum can affect spatial and perceptual abilities and cause weakness or hemiplegia (paralysis) on the left side of the body. Loss of blood supply to the left cerebrum will result in aphasia, a loss of speech and memory, as well as right-sided hemiplegia. Although no two stroke patients will experience the same injuries or disabilities, symptoms common to many stroke patients include vision problems, communication difficulties, dysphasia (inability to say what one wishes to say), emotional lability (uncontrolled, unexplained outward displays of crying, anger, or laughter which have no connection to patient's emotional state), depression, coma, and possible death.

For treatment to be effective, it should begin as soon as possible and within 4 hours after the stroke. On arrival at the hospital, a CT scan is done to determine if the cause is a blood clot or a ruptured blood vessel. If the cause is a blood clot, a drug such as tPA is used to dissolve the clot, restoring the blood supply to the brain.

Physicians are exploring ways to prevent strokes. Patients who have had TIAs are being examined to check the patency of the carotid artery to see if they would benefit from a balloon angioplasty. In 20% of patients who have had TIA, one aspirin per day seems to have prevented a stroke. Other drugs are currently being tested to determine if they can prevent or reverse the damage by a stroke. To reduce risk factors, encourage patients to stop smoking, get exercise, and control hypertension. Be aware of the signs and symptoms of stroke and get to a hospital immediately if they occur. A stroke occurs suddenly and a patient who wakes up paralyzed and unable to speak will be very frightened. A health care worker must be very supportive to the patient.

Figure 14-12: Stroke is caused by a sudden blockage of blood to the brain, thus depriving an area of the brain of oxygen.
9. An inflammation of the lining of the vein is called:
   a. hemorrhoid
   b. thrombus
   c. embolism
   d. phlebitis

### MATCHING

Match each term in Column I with its correct description in Column II.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. arteries</td>
<td>a. small arteries that lead to capillaries</td>
</tr>
<tr>
<td>2. capillaries</td>
<td>b. permit blood to flow in only one direction</td>
</tr>
<tr>
<td>3. valves</td>
<td>c. blood vessels that carry blood back to the heart</td>
</tr>
<tr>
<td>4. veins</td>
<td>d. connect arterioles with veins</td>
</tr>
<tr>
<td>5. arterioles</td>
<td>e. large, thick, muscle-walled vessels that carry blood away from the heart</td>
</tr>
<tr>
<td>6. aorta</td>
<td>f. lower chambers of the heart</td>
</tr>
<tr>
<td>7. atria</td>
<td>g. loss of elasticity in the artery</td>
</tr>
<tr>
<td>8. cardiac</td>
<td>h. referring to the lungs</td>
</tr>
<tr>
<td>9. coronary</td>
<td>i. largest artery in body</td>
</tr>
<tr>
<td>10. hypertension</td>
<td>j. traveling blood clot</td>
</tr>
<tr>
<td>11. atherosclerosis</td>
<td>k. upper chambers of heart</td>
</tr>
<tr>
<td>12. aneurysm</td>
<td>l. enlargement of a blood vessel</td>
</tr>
<tr>
<td>13. arteriosclerosis</td>
<td>m. circulation through kidneys</td>
</tr>
<tr>
<td>14. pericardium</td>
<td>n. blood pressure over 140/90</td>
</tr>
<tr>
<td>15. portal circulation</td>
<td>o. arteries that nourish heart</td>
</tr>
<tr>
<td>16. pulmonary</td>
<td>p. largest vein in body; returns to right atrium</td>
</tr>
<tr>
<td>17. embolism</td>
<td>q. deposit of fatty substance in the arteries</td>
</tr>
<tr>
<td>18. vena cava (superior and inferior)</td>
<td>r. pertaining to the heart</td>
</tr>
<tr>
<td>19. ventricles</td>
<td>s. goes to liver from small intestine</td>
</tr>
<tr>
<td></td>
<td>t. covering of heart</td>
</tr>
<tr>
<td></td>
<td>u. membrane that lines the chest cavity</td>
</tr>
</tbody>
</table>

### APPLYING THEORY TO PRACTICE

1. You are a red blood cell and you are leaving the arch of the aorta. Trace your journey to the right great toe. Name all the blood vessels through which you will travel.

2. You are a red blood cell in the left finger. You need oxygen and you must get to the lungs. Trace your journey from the finger to the lungs. Name the blood vessels and structures through which you will travel.

3. You have just heard about a friend's grandmother who has arteriosclerosis of the brain. Your friend asks you to explain the disease and how her grandmother will act.

4. The fetal heart is unique. Why is it different? Describe the structures of the fetal heart that change at birth.

5. Take the pulse and blood pressure of a 20-year-old, a 40-year-old, and a 70-year-old. Compare the results: if they are different, why are they different?

### CASE STUDY

Mrs. Frances arrives in the ER with her son George. She cannot speak and there is weakness and numbness on her right side. She is seen by Victoria, the nurse practitioner, who also notices a drooping on the right side of Mrs. Frances's face. George states that his mother was fine, eating her breakfast when this occurred. Victoria checks the woman's B/P and it is 130/100. The ER doctor and Victoria examine the patient and make the diagnosis of a cerebral vascular accident (CVA).

1. Describe what a CVA is. What is the other name given to a CVA?

2. What is the correlation between Mrs. Frances's B/P and her CVA?

3. What other body systems will be affected because of the CVA?

4. What is the major cause of strokes?

5. Explain the simple tests Victoria will do to determine Mrs. Frances's state of paralysis.

6. Mrs. Frances cannot speak. Which side of her brain was affected?

7. List some of the therapies Mrs. Frances will need.

8. Explain some of the actions people can take to avoid a CVA.