EVERY BEAT OF YOUR HEART pumps blood through your body, carrying oxygen and nutrients. The human cardiovascular system includes the heart and miles of blood vessels that work together to sustain life. In this unit, you will learn about the disorders of the cardiovascular system. Some are relatively minor problems that have little effect on a person or can be corrected with medical care, but others are more serious and may even be fatal.

Objective:

Describe disorders of the cardiovascular system.

Key Terms:

- anaphylactic shock
- aneurysm
- angina pectoris
- arteriosclerosis
- atherosclerosis
- atrioventricular (AV) node
- bradycardia
- cardiac tamponade
- cardiogenic shock
- cardiomyopathy
- cerebrovascular accidents
- congestive heart failure
- coronary artery disease
- dysrhythmias
- edema
- embolism
- fibrillation
- heart failure
- heart block
- hemorrhoids
- hypertension
- hypovolemic shock
- incompetent valves
- ischemia
- myocardial infarction
- myocardium
- necrosis
- neurogenic shock
- pericarditis
- pericardium
- phlebitis
- prolapsed mitral valves
- rheumatic heart disease
- right-sided heart failure
- septic shock
- sinoatrial (SA) node
- stenosis
- tachycardia
- thrombi
- thrombophlebitis
- varicose veins
Cardiovascular Disorders

Several common blood vessel disorders can cause problems with the cardiovascular system, some of which may be fatal.

**Arteriosclerosis** is a hardening of the artery walls, resulting in thickening and calcification. **Atherosclerosis** is a type of arteriosclerosis in which arteries are narrowed by fatty deposits and other matter. This may result in a reduction in blood flow to tissues, which can lead to **ischemia**, or insufficient blood supply, and possibly **necrosis**, or death of tissue. Ischemia of the heart muscle can cause a **myocardial infarction**, commonly called a heart attack.

Sclerotic arterial walls may weaken and widen abnormally to form an **aneurysm**, which in turn promotes the formation of **thrombi**, or abnormal clots. **Cerebrovascular accidents**, commonly called strokes, can result if the aneurysm ruptures or if an **embolism**, or travelling clot, blocks a cerebral artery. If this happens, the individual may suffer crippling or even fatal neurological damage.

**Varicose veins** are areas that form when blood pools in veins instead of continuing on toward the heart. **Hemorrhoids** are varicose veins in the anal area. **Phlebitis** is vein inflammation, which can be caused by an intravenous catheter. **Thrombophlebitis** is phlebitis caused by a clot and is characterized by pain and discoloration.

**DISORDERS OF HEART STRUCTURES**

The **pericardium** is a membrane that forms a sac enclosing the heart. It provides protection against friction. An inner layer of the pericardium covers the heart like the skin on a pear, while an outer layer of the pericardium fits around the heart like a sac. **Pericarditis** is inflammation of the pericardium, which leads to pericardial **edema**, an accumulation of fluid. **Cardiac tamponade** is a serious compression of the heart caused by the accumulation of fluid between the two pericardial layers.

The heart has four valves that prevent the backflow of blood and keep it flowing in the proper direction. Several disorders can affect the valves, preventing them from doing their jobs properly. **Incompetent valves** leak and allow blood to flow back into the chamber from which it came. **Stenosis** of the valves is a narrowing of the valves, which reduces the flow of blood through them. **Prolapsed mitral valves** are valves that leak because their edges extend into the left atrium when the left ventricle contracts. **Rheumatic heart disease** is a condition in which heart valves are damaged by inflammation due to a strep infection called rheumatic fever.

The **myocardium** is the cardiac muscle tissue forming the wall of the heart. Coronary artery disease reduces blood flow to the myocardium, leading to subsequent cardiovascular problems. **Coronary artery disease** includes atherosclerosis, thrombi, or emboli that narrow or block coronary arteries. When a blood clot occludes, or blocks, some part of a coronary artery, myocardial tissue death, or a myocardial infarction, results. **Angina pectoris** is a severe chest pain that occurs when insufficient blood reaches the myocardium.
A heartbeat should be regular and rhythmic. The **sinoatrial (SA) node** initiates electrical impulses that control the heartbeat. The impulses spread through the atria to the **atrioventricular (AV) node** to specialized fibers and then to the ventricles so each atrial beat is followed by a ventricular beat. Conditions such as myocardial infarction or inflammation, however, can cause **dysrhythmias**, also known as arrhythmias, which are irregular heart rates or irregular heart rhythms.

**Heart block** is a condition that occurs when the conduction of impulse from the AV node in the right atrium is blocked. Improper autonomic nervous control of the heart or a damaged SA node can result in an abnormally slow or rapid heart rate. **Bradycardia** is a slow heart rhythm of fewer than 100 beats per minute. **Tachycardia** is a rapid heart rhythm of more than 100 beats per minute.

**Fibrillation** is a condition in which the heart flutters because the muscle fibers are contracting out of step with each other. Ventricular fibrillation is a life-threatening condition in which the lack of ventricular pumping stops the flow of blood. This may cause death within minutes.

**DISORDERS OF CARDIOVASCULAR PHYSIOLOGY**

**Hypertension** is high blood pressure, in which the force of blood exerted on the arterial wall exceeds a pressure greater than 140/90mm Hg. The cause of primary hypertension is undetermined. Secondary hypertension is caused by kidney disease, hormonal problems, and pregnancy. Risk factors for hypertension include genetic factors, age, male gender, stress, obesity, and lack of exercise. Hypertension is called the “silent killer” because although it is often asymptomatic, it may lead to life-threatening kidney failure, heart failure, or stroke.

**Heart failure** is the inability of the heart to pump enough blood to sustain life. Many disorders can cause heart failure, including myocardial infarction, dysrhythmias, and **cardiomyopathy**, which is disease of the heart muscle. **Right-sided heart failure** is a condition in which blood backs up into the pulmonary circulation, overloading the right side of the heart. Left-sided heart failure, called **congestive heart failure**, is the inability of the left ventricle to pump blood effectively. Decreased pumping pressure in the systemic circulation causes the body to retain fluids and become congested.

Circulatory shock is the failure of the circulatory system to deliver blood to the tissues. **Cardiogenic shock** is a shock that results from any kind of heart failure. **Hypovolemic**
shock is a shock that results from decreased blood volume due to excessive loss of blood or other body fluids. **Neurogenic shock** is a shock that results from widespread dilation of blood vessels when vasodilators are overstimulated. **Anaphylactic shock** is an acute allergic reaction. **Septic shock** is a shock that results from infectious agents releasing toxins into the bloodstream.

**Summary:**

Many disorders affect the cardiovascular system. Often these result in a reduction in blood flow to tissues. This can lead to ischemia, or insufficient blood supply, which in turn can cause a myocardial infarction, commonly called a heart attack. A heartbeat should be regular and rhythmic, but some disorders cause dysrhythmias. Hypertension, or high blood pressure, is a very common cardiovascular disorder, although the cause is often unknown. Cardiovascular disorders may lead to heart failure, in which the heart is unable to pump enough blood to sustain life.

**Checking Your Knowledge:**

1. What is arteriosclerosis?
2. What are varicose veins?
3. What are some common disorders that affect heart valves?
4. What factors increase the risk of developing hypertension?
5. What are the different types of circulatory shock?
Expanding Your Knowledge:

Some cardiovascular diseases are genetic. In other words, you may have a greater chance of developing a disorder if a relative has it. Ask your parents about cardiovascular disorders that affect other members of your family. Consult your doctor, and ask whether those disorders are hereditary. Find out what other risk factors exist and whether you can do anything to lower your risk. Ask about the treatment for the disorders that run in your family.

Web Links:

Cardiovascular Disease

Heart Disease Drugs
http://www.healthcentral.com/heart-disease/drugs.html

High Blood Pressure