Chapter 9

Cardiovascular System

The Heart

Made of cardiac muscle.

Hollow, cone-shaped muscular organ.

Structure of the Heart

The heart is covered by a saclike membrane.

Pericardium- tough, fibrous external membrane

Parietal- lining the pericardium

Visceral- (epicardium) covering the surface of the heart

The space between the two internal layers is called the pericardial space (contains fluid)

Heart Wall

Epicardium- (outer visceral layer)

Myocardium- (heart cardiac muscle itself)

Endocardium- (lines the chambers of the heart and covers its valves)

Chambers of the Heart

It has a left and right side

The right side receives the blood from the body and sends it to the lungs to be oxygenated.

The left side receives the oxygenated blood and sends it to the tissues.

Atrium- cranial chamber

Interatrial septum- divides the atria

Thin walls and are the receiving chambers of the heart

Ventricle- ventral chamber

Interventricular septum- divides the ventricles

Thicker walls to pump the blood.

Valves

Atrioventricular valves- ensure that blood only flows in one direction

Mitral or bicuspid valve- left atrium and ventricle

Tricuspid valve- right atrium and ventricle

Semilunar valves- arteries into the ventricles located at the base of the pulmonary artery and the aorta.

Conduction System

SA node (sinoartial) aka pacemaker

Consists of cells where the electrical impulses originate

Produces atrial contractions

Force blood into the ventricle

AV node (atrioventricular)

Consists of the cells in which the electrical impulses continue down

Artioventricular bundle (bundle of His)

Continues on as the Purkinje fibers

Nerve Function in the Heart

Parasympathetic-

Supply the SA and AV nodes

Slow down the heart rate

Reduces impulse conduction

Constricts the coronary arteries

Sympathetic-

Affects the SA and AV nodes

Increases the heart rate

Dilates the coronary arteries

Cardiac Cycle

Includes the contraction (systole) and relaxation (diastole) or the chambers of the heart

All the chambers do not contract at the same time

The two atria contract together and then the two ventricles.

Types of blood Vessels

Arteries

Oxygenated blood is carried from the heart to all structures of the body

These are elastic tubes with three layers

Arterioles, Capillaries, and Venules

Arteries become smaller and smaller till they become arterioles (small arteries)

These feed the capillaries (billions of minute, thin walled vessels that communicate with other capillaries)

The capillaries distribute blood to the tissues.

Other pick-up blood from the tissues (venules) and pass the blood back to the veins then the heart

Veins

Hollow tubes which are similar to the arteries but have thinner and less elastic walls.

They transport blood back to the heart.

There are channels that help prevent backflow.

Blood

Structure

60% plasma (liquid)

40% formed elements

Functions

Distributes nutrients

Collects waste products of metabolism

Carries hormones of the different ductless glands

Maintains the fluid content of the tissues

Serves as a temperature regulator for the body

Blood volume is usually 6% to 8% of body weight.

Plasma

Clear, straw-colored, liquid portion of blood.

Approximately 90% water and 10% solutes

One of the solutes is fibrinogen, important in blood clotting

Serum- plasma will all clotting elements removed.

Blood Cells

Erythrocytes

Extremely small, nonnucleated disks

Contain hemoglobin (heme- iron and globin- protein)

Anemia- not having enough iron

Leukocytes

Much less numerous then erythrocytes, colorless, have nucleus.

Granulocytes

Originate in bone marrow

Lobed nuclei

Cytoplasm with fine granules

Classified by staining characteristics

Neutrophils

Red and blue stain granules

Phagocytosis (engulfs invading organisms)

Eosinophils

Orange or yellow acid dye-staining granules

Detoxify foreign proteins from allergens and parasitic infections

Basophils

Purple

Function is not sure, but they could prevent coagulation

Agranulocytes

Originate in lymphatic organs

No granules in cytoplasm

Round horseshoe shaped nucleus

Lymphocytes

Rounded nucleus

Phagocytosis function and antibody formation

Monocytes

Horseshoe shaped nucleus

Phagocyotsis

Blood Pressure

Systolic pressure- produced by the blood pressing against the walls of the arteries during the contraction of the ventricles.

Diastolic pressure- produced by the blood pressing against the walls of the arteries during the relaxation of the ventricles.

Circulation of the Blood

Tracing the Circulation

Left Ventricle

Arteries

Arterioles

Capillaries of the Body Tissue

Venules

Veins

Right Atrium

Right Ventricle

Pulmonary Artery

Arterioles

Capillaries of the Lungs

Venules

Pulmonary Veins

Left Atrium

Left Ventricle

The Lymphatic System

Considered part of the circulatory system because it is made up of fluid called lymph (comes from tissue fluids)

Lymph is an almost colorless fluid rich in white blood cells and it circulates through the lymphatic vessels

The Lymph Glands

Lymph glands (nodes) are numerous sacs along the vessels.

They vary in size from dots to bean-sized.

They are identified by their location.

They filter and remove bacteria and malignant cells.

They can be inflamed or swollen with ingested bacteria or toxins.
They make lymphocytes and monocytes.

The Spleen

A large, flatten, oval-shaped gland like organ.
Dark red in color
Located on the left side of the abdominal cavity.
The spleen enlarges during disease and increases in size with age.

Function:

Hemopoiesis- formation of lymphocytes, monocytes, and plasma cells

Phagocytosis- removal of destructive microorganisms

The Tonsils

These are three pairs of small, round, masses of lymphoid tissue that filter out bacteria or other foreign matter

Palatine- located at the back of the throat

Lingual- located at the root of tongue

Pharyngeal- located at the roof of the pharynx

The Thymus

Grayish, pink structure of lymph tissue, cranial to the heart
Produces cells that destroy foreign substances and forms lymphocytes