**MATRIC NUMBER: 18/MHS01/160**

**NAME: FASIPE BLESSING OLUWAFUNKE**

**COURSE CODE: ANA 202**

ASSIGNMENT:

1. Use the video you were provided with to describe the heart and it’s functions.

**THE HEART**

The heart is a muscle about the size of a humans fist. It lies behind and to the left of the **breastbone/sternum**. The heart pumps blood through the network of arteries and veins called the cardiovascular system.

The inside of the heart is divided into **four chambers:**

The top two chambers are called the **atria** and are collection chambers for blood.

The bottom two chambers are called the **ventricles** and they receive the blood from the atria and pump it to the lungs and to the body**.**

The chambers are separated by **valves** that control the direction of blood flow. There are four valves:

* Tricuspid valve
* Pulmonary valve
* Mitral valve and
* Aortic valve.

Circulation begins at the right side of the heart where blood from the body comes to the **right atrium,** this blood passes through the **right ventricle** where it is pumped to the **lungs** to receive oxygen.

Once it receives oxygen , it flows to the **left atrium** and then to the **left ventricle** where it is pumped to the **aorta** and the rest of the body.

On the right side of the heart, the **tricuspid valve** separates the **right atrium** and the **right ventricle** allowing blood to enter the ventricle but not flow backwards to the atrium, blood flows through the **pulmonary valve** to the lungs.

On the left side of the heart, **mitral valves** separates the **left atrium** and the **left ventricle**, blood flows from the **left ventricle** to the **aorta** through the **aortic valve** and to the rest to the body.

**Arteries** carry blood with oxygen and other nutrients throughout the body.

**Veins** takes blood back to the heart which pumps it to the lungs to be oxygenated.

The heart arteries, coronary arteries provide oxygen and nutrients to the heart muscle.

The **right coronary artery** supplies blood to the bottom and the back of the heart.

The **left coronary artery** splits into two vessels: One branch supplies blood to the front of the heart and the Other branch delivers blood to the left side of the heart.

An electric system transmits signals throughout the heart to control its pumping. The electrical signal starts in the **sinoatrial or SA node** which is located in the upper portion of the right atrium and it is known as the natural **pacemaker** of the heart. It sends out regular electrical impulses from the top chamber (the atrium) causing it to contract and pump blood into the bottom chamber(the ventricle).

The electrical impulses is then conducted to the ventricles through a form of **junction box** called the **AV or atrio-ventricular node**. The impulse spreads into the ventricles, causing the muscle to contract and pump blood to the lungs and the body.

Chemicals which circulate in the blood, and which are released by the nerves that regulate the heart, alter the speed of the pacemaker and the force of the pumping action of the ventricles.

For example, **adrenaline** increases the heart rate and the volume of blood pumped by the heart.

The wall of the heart consists of three layers of tissue:

* **Epicardium** — protective layer mostly made of connective tissue.
* **Myocardium** — the muscles of the heart.
* **Endocardium** — lines the inside of the heart and protects the valves and chambers.

These layers are covered in a thin protective coating called the pericardium.

Each heartbeat can be split into two parts:

**Diastole**: the atria and ventricles relax and fill with blood.

**Systole**: the atria contract (atrial systole) and push blood into the ventricles; then, as the atria start to relax, the ventricles contract (ventricular systole) and pump blood out of the heart.

When blood is sent through the pulmonary artery to the lungs, it travels through tiny capillaries on the surface of the lung’s alveoli (air sacs). Oxygen travels into the capillaries, and carbon dioxide travels from the capillaries into the air sacs, where it is breathed out into the atmosphere.

The muscles of the heart need to receive oxygenated blood, too. They are fed by the coronary arteries on the surface of the heart.

Where blood passes near to the surface of the body, such as at the wrist or neck, it is possible to feel your pulse; this is the rush of blood as it is pumped through the body by the heart.

**FUNCTIONS OF THE HEART**

* The purpose of the heart is to pump blood through blood vessels, arteries and veins to all parts of the body.
* The right atrium receives blood from the veins and pumps it to the right ventricle.
* The right ventricle receives blood from the right atrium and pumps it to the lungs, where it is loaded with oxygen.
* The left atrium receives oxygenated blood from the lungs and pumps it to the left ventricle.
* The left ventricle (the strongest chamber) pumps oxygen-rich blood to the rest of the body. The left ventricle’s vigorous contractions create our blood pressure.

The hearts blood-pumping cycle, called cardiac cycle, ensures that blood is distributed throughout the body. About 5.6 liters of blood circulate the body and three cardiac cycles are completed per minute.



1. Write on five congenital abnormalities of the heart.

An abnormality in the heart that develops before birth.

Congenital heart disease, or a congenital heart defect, is a heart abnormality present at birth. The problem can affect:

* the heart walls
* the heart valves
* the blood vessels

There are numerous types of congenital heart defects. They can range from simple conditions that don’t cause symptoms to complex problems that cause severe, life-threatening symptoms.

1. **Bicuspid aortic valve**: A bicuspid aortic valve (BAV) is an aortic valve that only has two leaflets, instead of three.

The aortic valve regulates blood flow from the heart into the aorta. The aorta is the major blood vessel that brings oxygen-rich blood to the body.

Some people are born with a bicuspid aortic valve, in which the aortic valve — located between the lower left heart chamber (left ventricle) and the main artery that leads to the body (aorta) — has only two (bicuspid) cusps instead of three. People may also be born with one (unicuspid) or four (quadricuspid) cusps, but these are rare. A bicuspid aortic valve may cause the heart's aortic valve to narrow (aortic valve stenosis). This narrowing prevents the valve from opening fully, which reduces or blocks blood flow from the heart to the body. In some cases, the aortic valve doesn't close tightly, causing blood to leak backward into the left ventricle (aortic valve regurgitation). Most people with a bicuspid aortic valve aren't affected by valve problems until they're adults, and some may not be affected until they're older adults. Some children with bicuspid aortic valves may have valve problems.

Some people with a bicuspid aortic valve may have an enlarged aorta — the main blood vessel leading from the heart. There is also an increased risk of aortic dissection.



BAV is present at birth (congenital). An abnormal aortic valve develops during the early weeks of pregnancy, when the baby's heart is developing. The cause of this problem is unclear, but it is the most common [congenital heart defect](https://medlineplus.gov/ency/article/001114.htm). BAV often runs in families.

A BAV may not be completely effective at stopping blood from leaking back into the heart. This leakage is called [aortic regurgitation](https://medlineplus.gov/ency/article/000179.htm). The aortic valve may also become stiff and not open up. This is called [aortic stenosis](https://medlineplus.gov/ency/article/000178.htm), which causes the heart to pump harder than usual to get blood through the valve. The aorta may become enlarged with this condition.

BAV is more common among males than females. A BAV often exists in babies with [coarctation of the aorta](https://medlineplus.gov/ency/article/000191.htm) (narrowing of the aorta). BAV is also seen in diseases in which there is a blockage to blood flow on the left side of the heart.

1. **Coarctation of the aorta** : Coarctation of the aorta or aortic coarctation is a narrowing of the aorta, the large blood vessel that branches off your heart and delivers oxygen-rich blood to your body. When this occurs, your heart must pump harder to force blood through the narrowed part of your aorta. Coarctation of the aorta is generally present at birth (congenital). The condition can range from mild to severe, and might not be detected until adulthood, depending on how much the aorta is narrowed.

Coarctation of the aorta often occurs along with other heart defects. While treatment is usually successful, the condition requires careful lifelong follow-up.

Coarctation of the aorta symptoms depend on the severity of the condition. Most people don't have symptoms. Children with serious aortic narrowing may show signs and symptoms earlier in life, but mild cases with no symptoms might not be diagnosed until adulthood. People may also have signs or symptoms of other heart defects that they have along with coarctation of the aorta.

Babies with severe coarctation of the aorta may begin having signs and symptoms shortly after birth. These include:

* Pale skin
* Irritability
* Heavy sweating
* Difficulty breathing
* Difficulty feeding

Left untreated, aortic coarctation in babies might lead to heart failure or death.

Older children and adults with coarctation of the aorta often don't have symptoms because their narrowing may be less severe.

Coarctation of the aorta may be defined as a constricted aortic segment that comprises localized medial thickening, with some infolding of the medial and superimposed neointimal tissue.[1]The localized constriction may form a shelflike structure with an eccentric opening or may be a membranous curtainlike structure with a central or eccentric opening. The coarctation may be discrete, or a long segment of the aorta may be narrowed; the former is more common.



1. **Ebstein anomaly**: Ebstein anomaly is a rare heart defect that's present at birth (congenital). In this condition, your tricuspid valve is in the wrong position and the valve's flaps (leaflets) are the incorrect shape. As a result, the valve does not work properly.

**Ebstein anomaly** is a congenital malformation of the heart that is characterized by apical displacement of the septal and posterior tricuspid valve leaflets, leading to atrialization of the right ventricle with a variable degree of malformation and displacement of the anterior leaflet

Blood might leak back through the valve, making your heart work less efficiently. Ebstein anomaly can also lead to enlargement of the heart and heart failure.

The tricuspid valve normally sits between the two right heart chambers (right atrium and right ventricle).

In Ebstein anomaly, the tricuspid valve sits lower than normal in the right ventricle. This makes it so that a portion of the right ventricle becomes part of the right atrium, causing the right atrium to enlarge and not work properly.

Also, the tricuspid valve's leaflets are abnormally formed. This can lead to blood leaking backward into the right atrium (tricuspid valve regurgitation).

The location of the valve and how poorly it's formed varies from person to person. Some people have a mildly abnormal valve. Others have a valve leaks severely.

Babies who have Ebstein’s also often have an **atrial septal defect (ASD)**.

Mild forms of Ebstein anomaly might not cause symptoms until later in adulthood. Signs and symptoms might include:

* Shortness of breath, especially with exertion
* Fatigue
* Heart palpitations or abnormal heart rhythms (arrhythmias)
* A bluish discoloration of the lips and skin caused by low oxygen (cyanosis)



1. **Hypoplastic left heart syndrome**: Hypoplastic left heart syndrome is a complex and rare heart defect present at birth (congenital). The left side of the heart is critically underdeveloped in hypoplastic left heart syndrome.

In hypoplastic left heart syndrome, the left side of the heart can't properly supply blood to the body because the lower left chamber (left ventricle) is too small or in some cases may not even exist. In addition, the valves on the left side of the heart (aortic valve and mitral valve) don't work properly, and the main artery leaving the heart (aorta) is smaller than normal.

For the first several days of life, the right side of the heart can pump blood both to the lungs and to the rest of the body through a blood vessel that connects the pulmonary artery directly to the aorta (ductus arteriosus). The oxygen-rich blood returns to the right side of the heart through a natural opening (foramen ovale) between the right chambers of the heart (atria). When the foramen ovale and the ductus arteriosus are open, they are referred to as being "patent."

If the ductus arteriosus and the foramen ovale close — which they normally do after the first day or two of life — the right side of the heart has no way to pump blood out to the body. Keeping these connections open with medication is necessary for survival in the first few days of life in babies with hypoplastic left heart syndrome. This will keep blood flowing to the body until heart surgery is performed.

Babies born with hypoplastic left heart syndrome usually are seriously ill soon after birth. Hypoplastic left heart syndrome symptoms include:

* Grayish-blue skin color (cyanosis)
* Rapid, difficult breathing
* Poor feeding
* Cold hands and feet
* Weak pulse
* Being unusually drowsy or inactive

If the natural connections between the heart's left and right sides (foramen ovale and ductus arteriosus) are allowed to close in the first few days of life in a baby with hypoplastic left heart syndrome, he or she can go into shock and may die.



1. **Wolff-Parkinson-White(WPW) syndrome:**

In Wolff-Parkinson-White (WPW) syndrome, an extra electrical pathway between your heart's upper and lower chambers causes a rapid heartbeat. The condition, which is present at birth, is fairly rare.

The episodes of fast heartbeats usually aren't life-threatening, but serious heart problems can occur. Treatment can stop or prevent episodes of fast heartbeats. A catheter-based procedure (ablation) can permanently correct the heart rhythm problems.

The extra electrical pathway that causes a rapid heartbeat is present at birth. An abnormal gene is the cause in a small percentage of people with WPW. The syndrome also is associated with some forms of congenital heart disease, such as Ebstein anomaly.

In WPW syndrome, an extra electrical pathway connects the atria and ventricles, allowing electrical impulses to bypass the AV node. This detour activates the ventricles too early.

The extra pathway can also transmit electrical impulses from the ventricles back to the atria, disrupting the coordinated movement of the electrical signals through the heart, leading to changes in the heart rhythm.

The most common arrhythmia associated with WPW syndrome is called paroxysmal supraventricular tachycardia. Some people with WPW syndrome have a type of irregular heartbeat known as atrial fibrillation.

Signs and symptoms in infants with WPW syndrome can include:

* Grayish or blueish (ashen) skin color
* Restlessness or irritability
* Rapid breathing
* Poor eating

For many people, WPW syndrome doesn't cause serious problems. But complications can occur. It's not always possible to know your risk of serious heart-related events. If WPW syndrome is untreated — particularly if you have other heart conditions — you might have:

* Fainting spells
* Fast heartbeats
* Rarely, sudden cardiac arrest

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