

Session 4A: How Does the Heart Work?

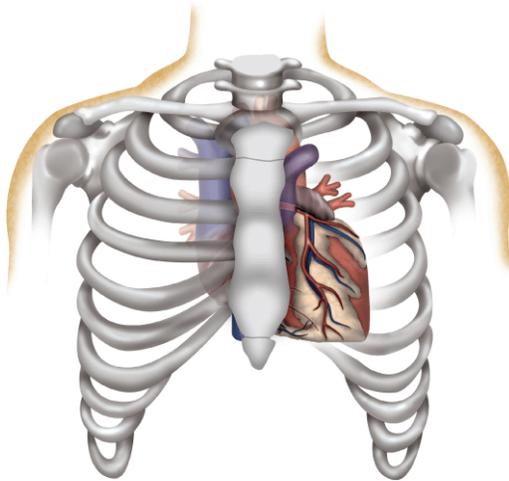


Figure 1: The heart within the chest cavity

Your heart

The heart is a hollow, muscular organ located between the lungs and underneath the breastbone. It sits slightly to the left, and is about the size of your fist. Your heart is a muscle that pumps more than 100,000 times per day, bringing oxygen-rich blood and nutrients to your entire body through arteries and veins. Blood also takes away waste products and carbon dioxide to be removed from the body.

Anatomy of the heart

Your heart is divided into four sections (or chambers):

- Two at the top
 - Called the left and right atria
 - The atria receive blood from veins
- Two at the bottom
 - Called the left and right ventricles
 - The right ventricle pumps blood from the heart to the lungs to pick up oxygen.
 - The left ventricle pumps the oxygen-rich blood through your entire body.

A muscular wall (the septum) separates the right side from the left.

The left and right chambers are connected by one-way valves that open and close with every heartbeat. Valves ensure blood is pumped through the heart in one direction.

The heart wall is made up of three layers. The outer layer is called the epicardium. The middle layer is the actual heart muscle and is called the myocardium. The inner layer of the heart is called the endocardium. The heart is contained within a sac called the pericardium.

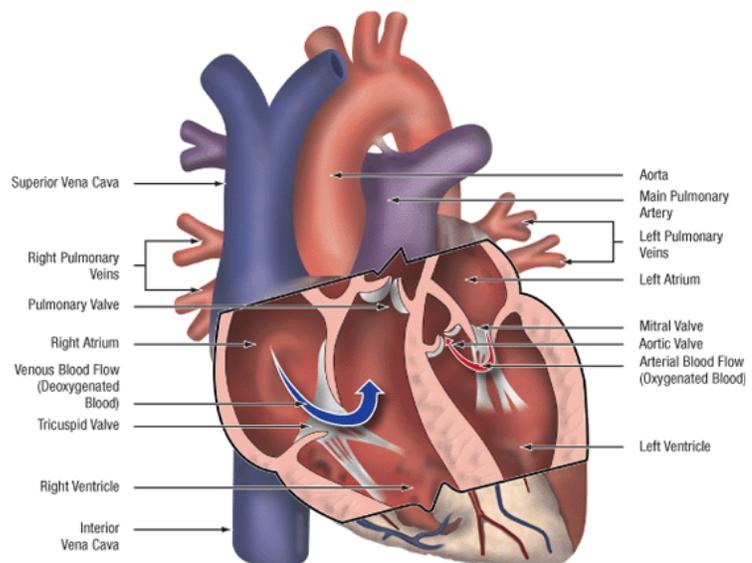


Figure 2: The Heart – Interior

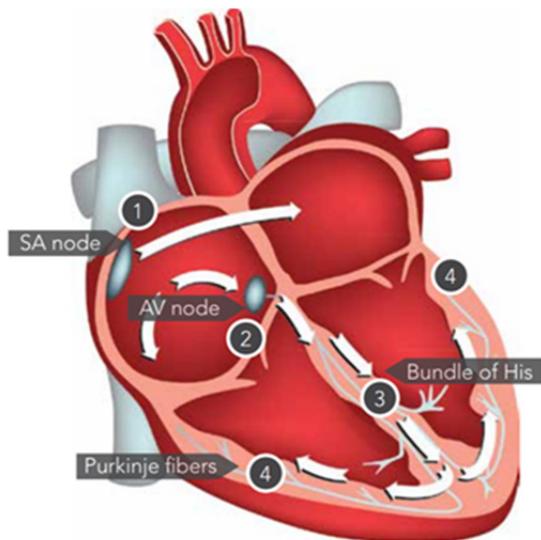
How it works

To pump blood throughout the body, your heart pumps in two-stages.

1. First it contracts.
2. Then it relaxes

This action is similar to clenching and unclenching your fist.

This motion is controlled by an electrical signal that starts in the right atrium, at the sinoatrial node (SA Node). This electrical signal passes throughout the heart, causing the different areas of the heart to contract or relax at just the right time. This creates a heartbeat with a regular rhythm. If the signal is too slow, fast, or erratic, the heart cannot beat properly. This is called arrhythmia. The electrical signal activity in various parts of the heart can be recorded on an electrocardiogram (ECG).



What happens when your heart beats?

1. Oxygen-poor blood flows from your body (muscles, organs, brain and heart) into the right atrium. When it's full, the atrium contracts.

2. When the atrium contracts, the tricuspid valve between the right atrium and the right ventricle opens. The blood flows into the right ventricle.

3. When the right ventricle is full it contracts and pumps the blood to the lungs.

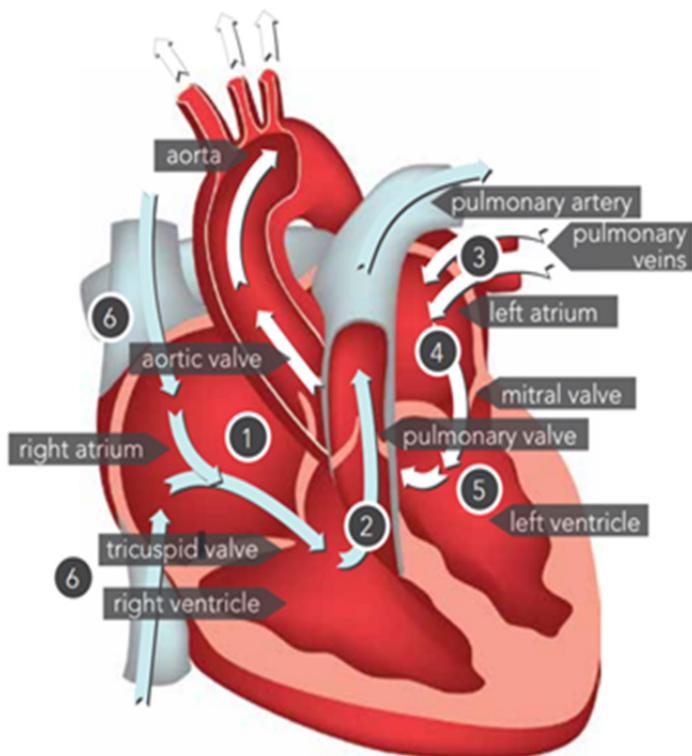
4. In the lungs, carbon dioxide is removed and fresh oxygen is added.

5. The blood then flows into the left atrium.

6. When the left atrium contracts, the mitral valve between the left atrium and left ventricle opens. The

blood flows into the left ventricle.

7. The left ventricle pumps the oxygen-rich blood through the aortic valve to the aorta, and out to the rest of your body.



The Heart's Blood Supply

The heart's job is to deliver blood filled with oxygen and nutrients to the entire body. The heart also supplies itself with oxygen-rich blood through the coronary arteries surrounding the heart. The coronary arteries are located on the surface of the heart.

There are four main arteries:

- Right coronary artery (RCA) on the right side of the heart, which supplies blood to the walls of the ventricles and the right atrium
- Left main coronary artery (LCA) on the left side of the heart, which splits into 2 branches:
 - Left anterior descending (LAD) artery, which supplies blood to the front of the heart, walls of the ventricles, and the left atrium
 - Circumflex artery, which supplies blood to the back of the heart, walls of the ventricles and left atrium

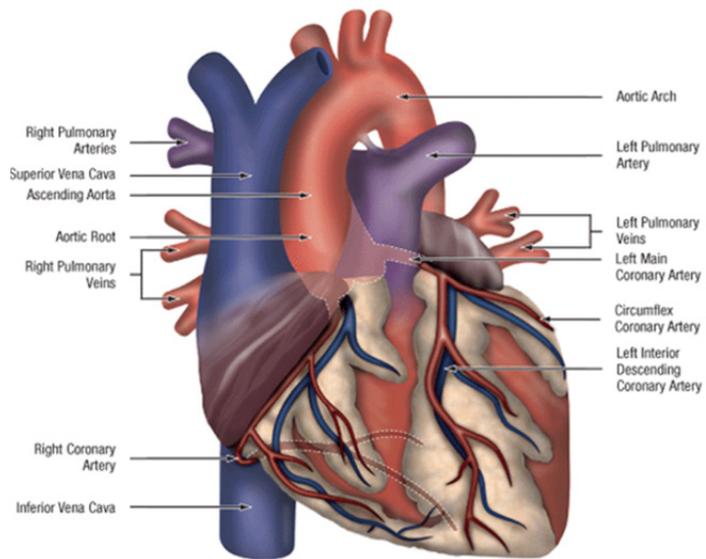


Figure 3: The Heart – Exterior

All the coronary artery branches send many tiny blood vessels deep into the heart muscle to supply oxygen rich blood to all layers of the heart. These arteries have an important role in maintaining the health and activity of your heart. When they become narrowed or blocked, the heart doesn't get enough oxygen to function effectively. This is Cardiovascular Disease (CVD).

Your Pulse

With each beat of your heart, blood is pushed through your arteries. This is what creates your pulse. Your heart rate (your pulse) is the number of times your heart beats per minute. Normal heart rate varies from person to person. Knowing your heart rate can help you spot health problems. A normal adult resting heart rate is usually about 60 to 100 beats per minute.

- Female hearts tend to beat faster than male hearts because they're slightly smaller
- During rest, your heartbeat will slow down
- With exercise, it can go faster

See page 13 for instructions on how to measure your pulse. In the program, you're encouraged to wear a heart rate monitor, which will track your heart rate for you.