ATI TEAS Science Review

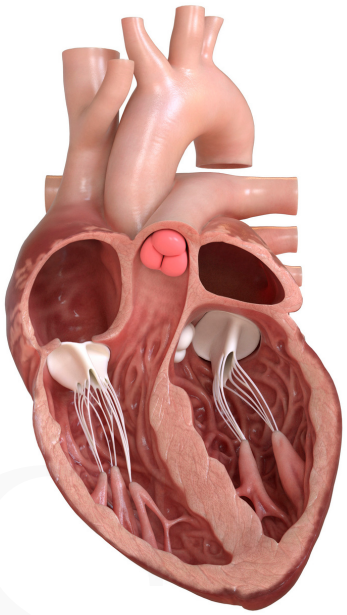
Cardiovascular System

Ivy Robelo

@PetiteAndSoignee
www.PetiteAndSoignee.com

Function: 1) Movement of blood and lymph around the body
2) Nutrient distribution
3) Waste removal
4) Communication
5) Protection

System consists of: The heart, blood vessels, and blood



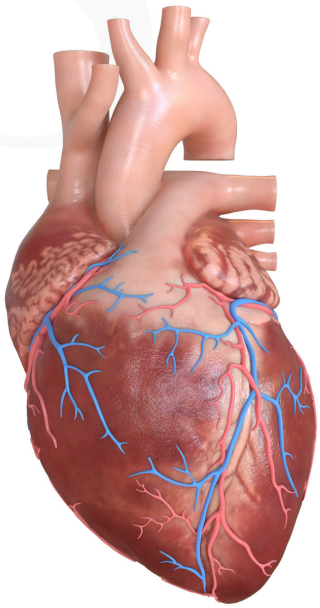
Heart: The main organ of the circulatory system. It consists of four chambers: The left and right atria, and the left and right ventricles. It pumps blood throughout the body.

• Location- in the mediastinum of thoracic cavity.
• Function- generates pressure to pump blood through circulatory system
• Orientation- flat base is directed toward higher right shoulder, and pointed apex points to left hip.

Heart Coverings

• Pericardium- the two-layered membranous sac in which the heart sits.

Heart Layers



• Epicardium- the epithelium clinging to the outer heart wall (is visceral pericardium.
• Myocardium- the middle layer composed of cardiac muscles tissue and connective tissue forming the fibrous skeleton.
• Endocardium- the epithelium clinging to the inner surfaces of the heart chambers.

** The heart is supplied with blood by the coronary arteries.

Atria (2): receive blood returning to the heart from other areas of the body; the superior chambers, ear like extensions of the atria, receiving chambers limited pumping means thin walls.

Ventricles (2): the inferior chambers, majority of heart volume, pumping chambers has thick walls; collect and expels blood from the heart; The left ventricle is the strongest chamber because it pumps blood to the entire body.

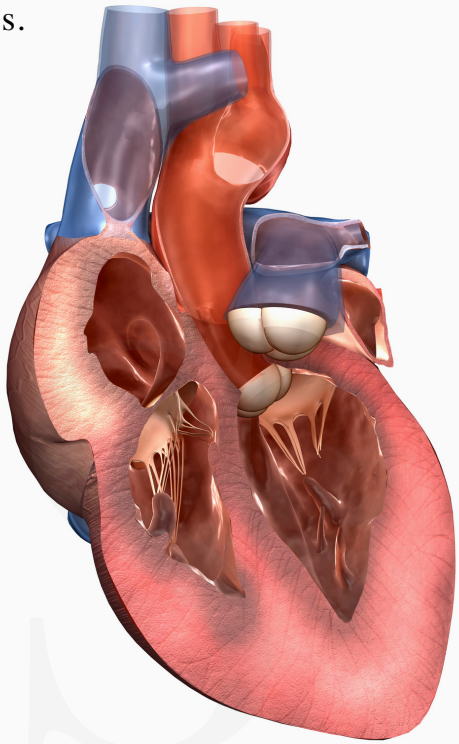
Atrioventricular (AV) Valves: Seperates the atria and ventricles

Tricuspid Valve: separates the right atrium and right ventricle

Mitral (AKA Bicuspid) Valve: separates the left atrium and left ventricle

Sulci – the indentations on the outer heart surface, correspond between chambers contains fats and vessels.

Septa- the internal walls that divide the chambers.



Right Atrium

• Superior Vena Cava- blood returning from above the diaphragm.

• Inferior Vena Cava - blood returning from below the diaphragm.

• Coronary Sinus- blood returning from the heart wall.

Left Atrium

• 4 pulmonary veins- blood returning from lungs.

**Blood only pass through ½ of the heart at a time, and therefore must pass through the heart twice to complete circulation.

CIRCULATION

Superior & Inferior Vena Cava -→ Right Atrium-→ Tricuspid Valve-→ Right Ventricle → Pulmonary Semi Lunar Valve-→ Pulmonary Trunk -→ Lungs-→ Heart-→ Four Pulmonary Veins--→ Left Atrium ---→ Mitral Valve--→ Left Ventricle-→ Aortic Semilunar Valve--→ Aorta

Artery: A blood vessel that carries blood **AWAY** from the heart. **A**rtery = **A**way

Usually carries oxygenated blood (EXCEPTION: pulmonary artery). The aorta is the largest artery in the body.

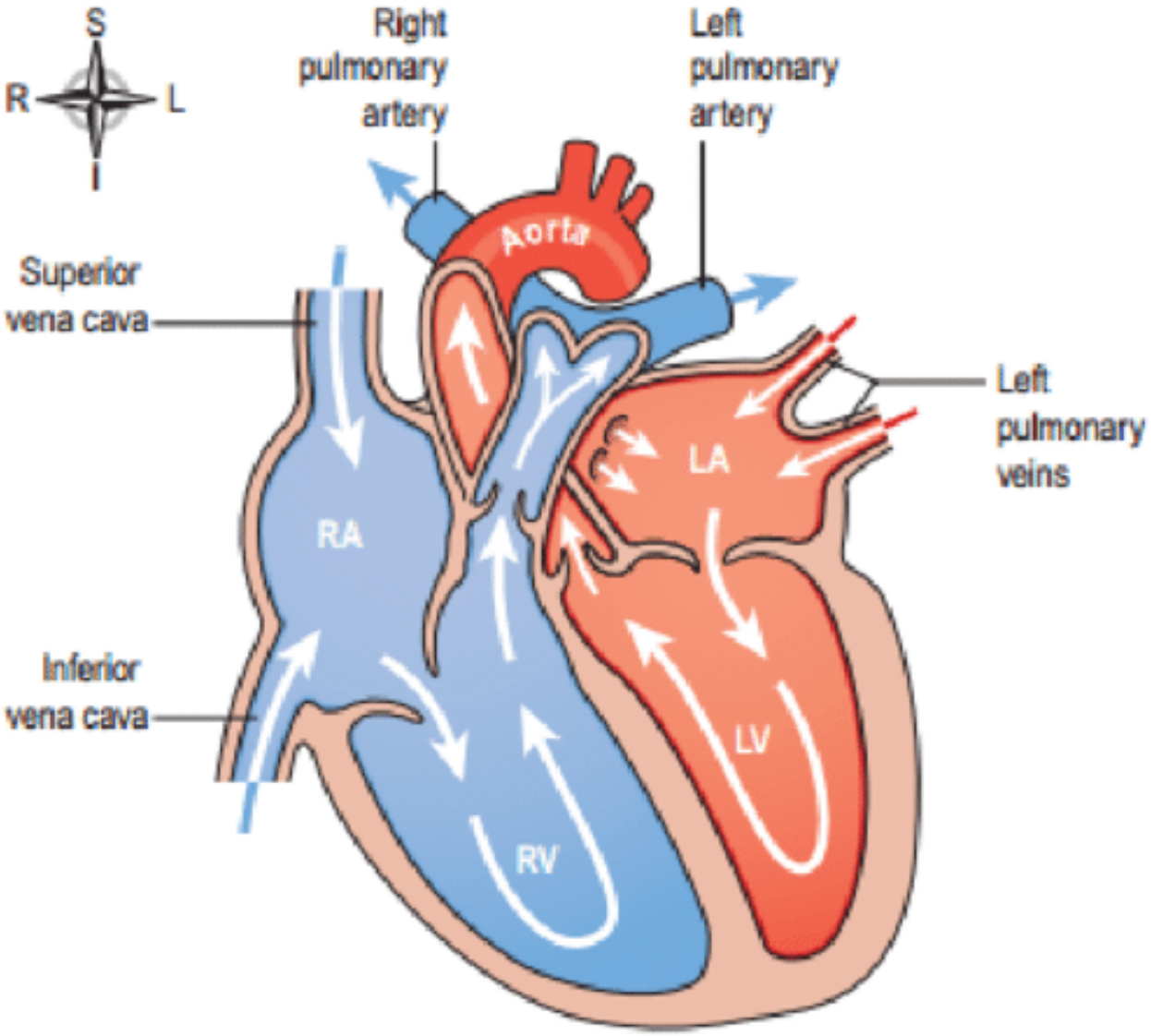
Vein: A blood vessel that carries blood TO the heart.

Usually carries deoxygenated blood (EXCEPTION: pulmonary veins). The inferior vena cava is the largest vein in the body.

Heart Sounds:

LUB = AV valves closing **DUB = Semilunar Valves Close**

Blood flow through the heart



Capillaries: The smallest and most abundant blood vessels. They connect arterioles to venules. The consist of a single layer of epithelial tissue.
Arteriole: A very small artery that leads to a capillary
Venule: A very small vein that collects blood from capillary

Blood: A constantly circulating fluid that provides the body with different nutrients. It also removes waste products such as carbon dioxide and carries oxygen throughout the body.

Universal blood donor: **O-**

Universal blood recipient: **AB+**

- pH- 7.35-7.45
- Volume- 4-6L

Four Main Components of Blood:

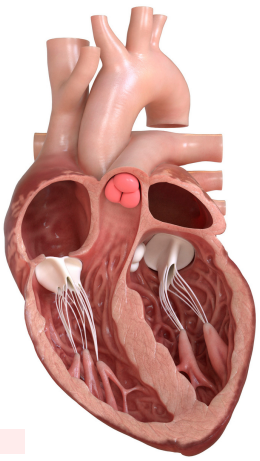
1) Red Blood Cells (RBC): Erythrocytes - carry hemoglobin and oxygen (anemia affects O2 transportation)
2) White Blood Cells (WBC): Leukocytes - immunity cells that protect you from illness and disease
3) Platelets: AKA thrombocytes. Forms clots and prevents bleeding. Thrombocytopenia is low platelet levels in the blood.
4) Plasma: Liquid portion of blood

Closed Double Loop System:

Blood flows through the heart twice!
1) Once when it is pumping oxygenated blood to the body (systemic loop) and 2) again when it is pumping deoxygenated blood to the lungs (pulmonary loop).

1) Pulmonary Loop: Deoxygenated blood is pumped from the right ventricle to the lungs (where it picks up oxygen) and then returns oxygenated to the heart in the left atrium.

2) Systemic Loop: Oxygenated blood is pumped from left ventricle to the body and then returns deoxygenated to the heart in the right atrium via the superior and inferior vena cava.



Systole: The top number in blood pressure readings. It is the contraction of the ventricles when they expel blood.
Diastole: The bottom number in blood pressure readings. It is the relaxation of ventricles when they refill with blood.

Sinoatrial Node (SA node): AKA the "pacemaker" of the heart. It controls heart contractions through electrical signals that are sent to the a**trioventricular node** (AV node) and **purkinje fibers**.

Blood Pressure: It is the pressure of circulating blood against the walls of blood vessels.

Pericardium: The sac that encloses the heart. It is the heart's outermost layer.

Myocardium: The middle layer of the heart that is muscular and referred to as cardiac muscles.

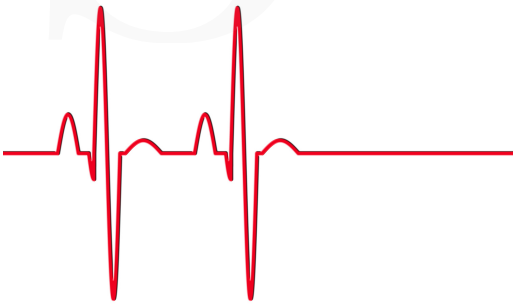
Endocardium: The innermost layer of the heart. It also lines the heart valves and other heart structures.

Purkinje Fibers: Bundles of nerve tissues that allows the heart to conduct nerve impulses. They innervate the right and left ventricles.

Bundle of HIS: sends electrical impulse to purkinje fibers.

Arrythmias: Irregular/abnormal heart beat. Ventricular arrythmias are the most dangerous.

Bradycardia: Pulse rate less than 60 bpm.



Tachycardia: Pulse rate more than 100 bpm.

Ischemia: Lack of oxygen to the heart muscle.

Angina Pectoris: Chest pain from lack of oxygen.

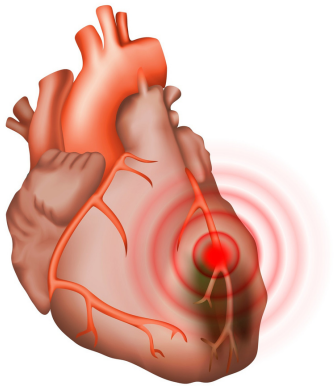
Dyspnea: Shortness of breath

Bicuspid/Mitral Valve: Seperates the left atria and left ventricle.

Tricuspid Valve: seperates the right atria and right ventricle.

Pulmonary Valve: semilunar seperates right ventricle and pulmonary artery.

Myocardial Infarction: AKA heart attack. It is the death of the heart muscle due to inadequate blood supply. "Myo" means muscle. "Cardial" means heart. "Infarct" means lack of oxygen (due to plaque blockages). There are two types of infact: 1) **Full thickness** (transmural) infarct which is considered to be more more serious, and 2) **Partial thickness** (subendocardial) infarct.



- Cardiomyocytes receive less oxygen from the coronary arteries. This causes pain signals to be sent to the brain. This can feel like indigestion or arm pain (referred pain). People may feel pain in the arms because the nerves connected to the heart have the same origin as some of the nerves connected to the arms.
- A clot can form which decreases oxygen to the cardiomyocytes. The brain detects the decrease in oxygen and sends a surge of adrenaline into the blood stream which spreads throughout the body.
- This causes **tachycardia.** The clot grows larger which blocks the artery further and cardiomyocytes barely get any oxygen. This causes the cardiomyocytes to slow down the rate of contraction to preserve energy.
- The contractions continue to slow down until they completely stop altogether. The rest of the heart compensates for this dying patch of cardiomyocytes by beating faster. Oxygen depleted cardiomyocytes cannot get rid of natural metabolic waste products which causes their membranes to rupture. The ruptured membranes allow proteins (troponin) to leak into the artery. **Troponin** is a specific kind of protein that only heart cells have and is an indicator of a heart attack during blood tests.
- Heart fatigues from tachycardia and becomes weaker which can result in **dyspnea** or dizziness. Cardiomyocytes eventually die completely.
- 20 minutes after a heart attack comes on, 500 cardiomyocytes are lost per second. Need to limit the amount of cardiomyocytes lost or else the heart won't beat normally again.

Stroke: damage to brain due to inadequate blood supply.

Aneurysm: localized abnormal, weak spot on a blood vessel wall that causes an outward bulging likened to a bubble or balloon. Hemorrhage occurs when it bursts.

Atherosclerosis: narrowing of arteries due to plaque buildup on artery walls

Anemia: not enough healthy RBC

Arrhythmia: Abnormal heart rhythm

Hypertension: high BP. Systole over 140mmHg; Diastole over 90 mmHg

About Me

Hi there! My name is Ivy and I am the founder of Petite and Soignée. I am currently a licensed physical therapist assistant, dermatology and cosmetic medical assistant, and a nursing student in an accelerated BSN program. Over the years, I have researched and learned about different skincare products, ingredients, skin conditions, diseases, and new technologies and procedures within the field. I decided to join a dermatology practice so that I could learn more about skincare within a clinical setting. This position taught me so much about the science of skin that it led me to pursue nursing. My goal is to specialize in dermatology in the future.

You may be wondering what does *soignée* even mean? ***Soignée*** (pronounced "swan-yay") is a feminine French word meaning *"to dress elegantly", "well-groomed", "sleek" "well maintained" or "elegantly designed"*. The word perfectly describes the way that I like to present myself on a daily basis. On my website, I share all of my skincare and beauty tips for everyone to feel soignée.

Don't forget to follow my other social media accounts!

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