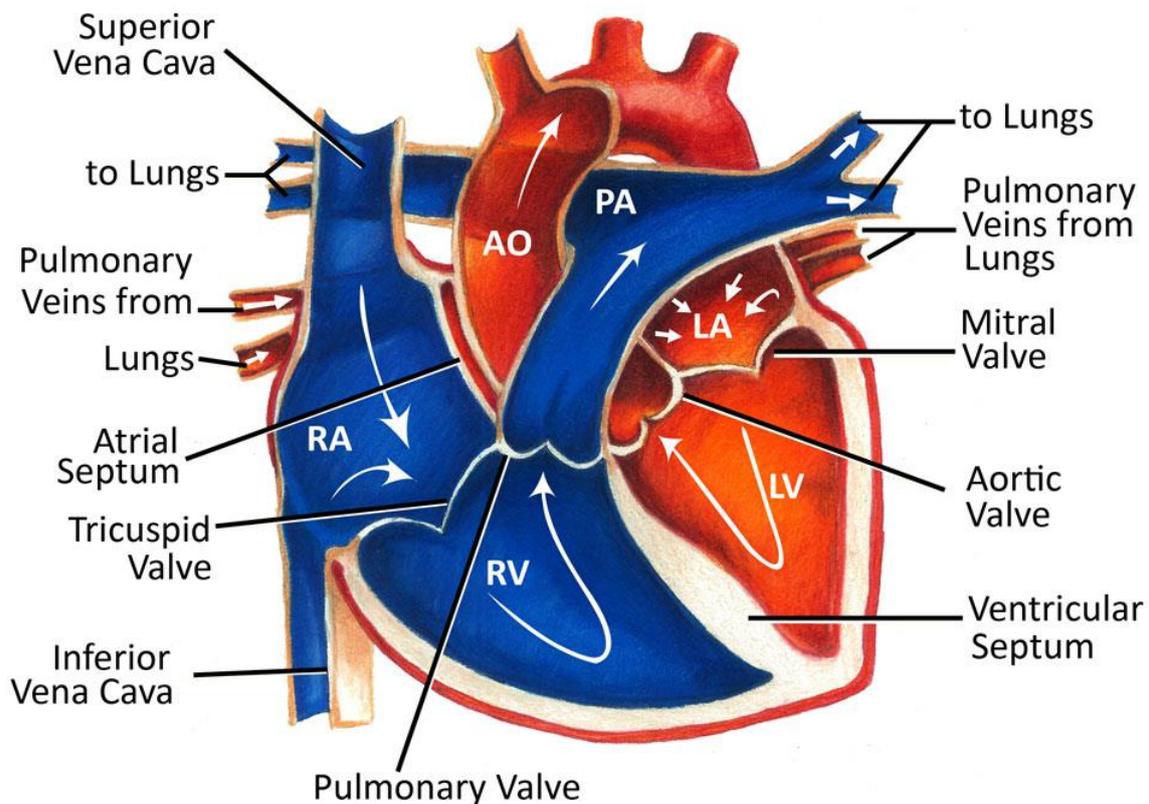
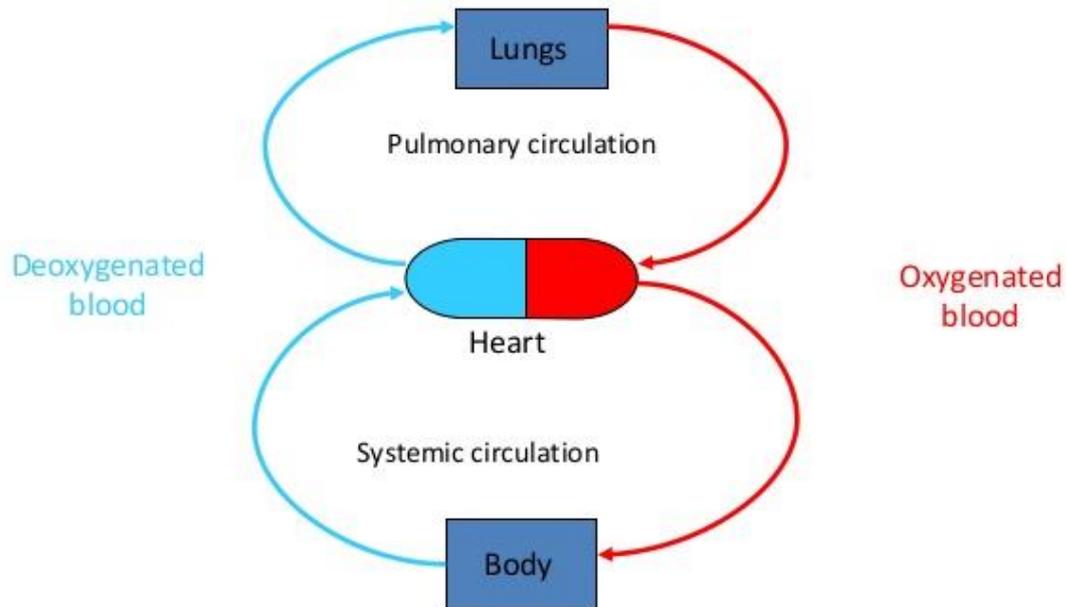


Heart and Circulation

The human heart is made up of 4 chambers: two atria (right and left) and two ventricles (right and left). The two sides of the heart (right and left) are separated by a septum which prevents oxygenated and deoxygenated blood from mixing. Initially, deoxygenated blood from the vena cava enters the right atrium. The right atrium contracts, forcing the tricuspid valve open and allowing the blood to flow to the right ventricle. This contracts forcing the pulmonary valve to open and allowing the deoxygenated blood to flow to the lungs. Here, it is oxygenated and the blood travels via the pulmonary vein to the left atrium. The left atrium will contract forcing the mitral/bicuspid valve to open. Blood flows into the left ventricle. The left ventricle contracts forcing the aortic valve open and allowing the oxygenated blood to flow into the aorta. This complete the cardiac cycle. The left ventricle is bigger and thicker than the right ventricle because it pumps blood over a longer distance to the rest of the body rather than just to the lungs. The two atrioventricular valves are the tricuspid and mitral/bicuspid valves and the two semilunar valves are the aortic and pulmonary valves. The valves ensure that blood flows in one direction through the heart and prevents backflow of blood. The heart is cardiac muscle and works like a pump. In humans, it is a double circulatory system because the right side pumps blood to the pulmonary circulation and the left side to the systemic circulation. Blood enters the heart twice in every cycle: through the vena cava and through the pulmonary vein. The right side carries deoxygenated blood and the left side carries oxygenated blood; the two are kept separate by the septum in the middle. The double circulatory system is more efficient than the single circulatory system (found in fish for example) because the blood is transported at a faster rate and under higher pressure. This allows the needs of organisms and cells with high metabolic requirements to be met.



Blood circulation



Electrocardiogram (ECG)

Records the electrical activity of the heart and provides important information about the heart rate, rhythm and function. It is commonly used to diagnose cardiac problems (e.g. heart attack, heart block, fibrillation etc.).

Factors increasing the risk of heart disease and circulatory problems:

- 1) Diabetes: complications of too much blood sugar include peripheral vascular disease and coronary heart disease. Too much blood sugar increases heart rate and may also be converted to fats.
- 2) High blood pressure: increases the cardiac workload.
- 3) Obesity: Increases cardiac workload. Contributes to atherosclerosis.
- 4) High cholesterol: blocks the arteries through atherosclerosis. Increases risk of heart attack and stroke.
- 5) Lack of exercise and unhealthy diets: poor stroke volume and high heart rate increases cardiac workload.
- 6) Increased age: narrowing of arteries increases blood pressure and increases risk of heart attack and stroke.
- 7) Family history of heart and circulatory diseases: a genetic contributor.
- 8) Smoking: nicotine causes constriction of the arteries and carbon monoxide reduces the oxygen carrying capacity of haemoglobin.

- 9) Excess alcohol: reduces oxygen delivered to cells by slowing down the heart.

Interventions

- 1) Statins: a medication used to lower blood cholesterol and reduce the risk of heart disease.
- 2) Stent: a tube inserted into a blocked artery to keep it open, restoring blood flow. The stent can be made of metal or plastic.
- 3) Angioplasty: used to re-open narrowed arteries using an inflatable balloon. An endoscopic procedure.
- 4) Pacemaker: artificial pacemaker can be used to correct heart rhythms.
- 5) CABG (Coronary Artery Bypass Graft) – bypasses the blocked vessel by connecting healthy ones together.