

# Component 1 The Cardiovascular System

## Functions of the cardiovascular system:

The cardiovascular system consists of the:

- **The heart** pumps blood around the body
- **Blood** transports gasses, blood cells and nutrients
- **Blood vessels** carry the blood

Function	Explanation
<b>Transport of nutrients</b>	Nutrients we eat are broken down from the food we eat and transported to the body in the blood
<b>Transport of oxygen</b>	The cardiovascular system transports oxygen around the body in the blood Oxygen is needed to provide energy to the working muscles during aerobic exercise
<b>Transport of carbon dioxide</b>	Carbon dioxide is produced as a by-product during aerobic energy production. The cardiovascular system takes carbon dioxide away from the muscles to the lungs and exhaled.
<b>Clotting of open wounds</b>	Blood contains blood cells called platelets. They are transported in the blood. They help to clot wounds by performing a plug to prevent blood loss
<b>Regulation of body temperature</b>	Blood vessels can help regulate body temperature. When we get hot blood vessels near the skin will get bigger ( <b>vasodilation</b> ) this will increase blood flow so heat can radiate from the skin When we get cold the blood vessels near the skin will get smaller ( <b>vasoconstriction</b> ) this will decrease blood flow so less heat is lost through radiation

## Redistribution of blood flow:

**Vascular Shunting:** When we exercise blood is redistributed. The working muscles need more oxygen than other inactive areas of the body such as the stomach. Blood is diverted away from inactive areas to the working muscles.

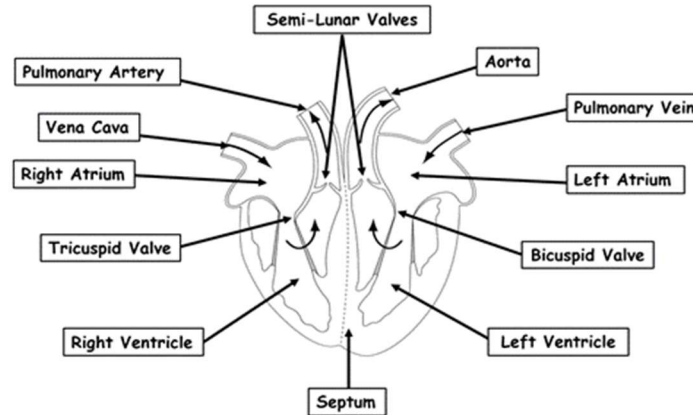


**Vasoconstriction** means that the blood vessels constrict to make them smaller. Chemical changes signal the nervous system to **constrict** blood vessels to **inactive** areas.



**Vasodilation** means that the blood vessels dilate to make them bigger. Chemical changes signal the nervous system to dilate blood vessels that supply active areas.

## Structure of the heart:



**Septum** separates the right and left sides of the heart

**Valves** prevent the backflow of blood

**Arteries** take blood away from the heart

**Veins** take blood towards the heart

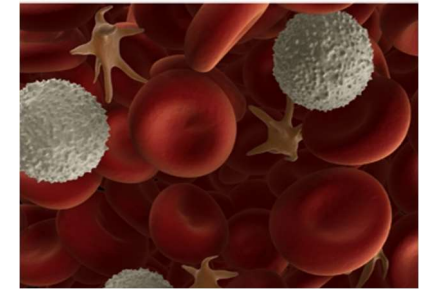
**Pulmonary artery** takes blood to the lungs

**Pulmonary vein** takes blood from the lungs back to the heart

**Aorta** delivers oxygenated blood to the body

## Function of blood:

Blood has four components that each play a role in physical activity:



### Red blood cells

Red blood cells carry oxygen and carbon dioxide.

The oxygen binds with haemoglobin in the blood. It is then transported to the working muscles by the plasma

The waste product carbon dioxide is also transported by the red blood cells, it is also carried by the plasma

### White blood cells

White blood cells fight infection and disease. When playing sport, they prevent infection if we get cut or scratched. They also keep us healthy so we are fit to train and take part in physical activity

### Platelets

Platelets help prevent bleeding by clotting (sticking together) and forming a plug. This is important to allow performers such as boxers to stop the bleeding if they get a cut, allowing them to continue performing

### Plasma

Plasma is the liquid part of the blood it acts as a transport system that transports the blood cells, platelets and nutrients to different parts of the body

## Structure of blood vessels:

Blood Vessel	Structure	Importance During Physical Activity
<b>Artery</b> 	<ul style="list-style-type: none"> <li>• Thick muscular walls</li> <li>• Thick elastic walls</li> <li>• Small lumen (internal diameter)</li> <li>• Carry blood at high pressure</li> <li>• Carry blood away from the heart</li> <li>• Usually carry oxygenated blood (except the pulmonary artery)</li> </ul>	When we exercise, blood pressure increases due to the demand for oxygen from the working muscles. Arteries take the blood to the working muscles. They dilate to allow more blood through
<b>Vein</b> 	<ul style="list-style-type: none"> <li>• Thin walls</li> <li>• Large lumen (internal diameter)</li> <li>• Carry blood at low pressure</li> <li>• Contain valves</li> <li>• Mainly carry deoxygenated blood (except the pulmonary vein)</li> </ul>	When we exercise aerobically the body produces waste products such as carbon dioxide. The blood in the veins take this to the lungs to be exhaled. The valves in the veins prevent the back flow of blood at low pressure
<b>Capillary</b> 	<ul style="list-style-type: none"> <li>• Very thin walls (one cell thick)</li> <li>• Small lumen (internal diameter)</li> <li>• Link smaller arteries with small veins</li> <li>• Allow gaseous exchange</li> </ul>	When we exercise, we need to deliver oxygen to the working muscles and remove the waste product, carbon dioxide. Capillaries allow the gaseous exchange at the lungs and the muscles