

## **Blood vessels and Components of Blood**

### **Arteries:**

- Carry blood away from the heart.
- Carry oxygenated blood (except the pulmonary artery which carries deoxygenated blood to the lungs from the heart).
- Have a thick muscle and elastic wall.
- High blood pressure.
- No valves.
- Lumen is smaller than veins but bigger than capillaries.
- Arteries branch into smaller arterioles.
- Biggest artery is the aorta.

### **Veins:**

- Largest type of blood vessel.
- Largest lumen of all the types of blood vessels.
- Thin walls.
- Valves to prevent backflow of blood.
- Low blood pressure.
- Carry blood back to the heart.
- Carry deoxygenated blood (except the pulmonary vein which carries oxygenated blood back to the heart from the lungs).
- Small veins are known as venules.
- Biggest vein is the vena cava.

### **Capillaries**

- Smallest type of blood vessel. Smallest lumen.
- One-cell thick (endothelium only) for quick diffusion.
- Large surface area to volume ratio for rapid diffusion.
- Carry a mixture of oxygenated and deoxygenated blood.
- Connect the arteries and veins (i.e. arterioles and venules).
- No valves.
- Medium blood pressure.

### **Role of the skeletal muscles and respiratory muscles to aid venous return back to the heart:**

- Contraction of the skeletal muscles during exercise helps to squeeze the veins, increasing the pressure from below so that the blood is forced up towards the heart.
- The process of breathing in (inspiration) increases venous return to the heart. This is because it reduces the pressure inside the thorax, allowing more blood to be sucked up as it moves up the veins.

### **Varicose veins:**

An abnormality where the venous return is impeded because of the valves in the veins not functioning properly. As they do not close properly, backflow of blood occurs and the veins become

enlarged and prominent. This is more likely in those who do not exercise regularly and those who are overweight/obese.

**Components of blood:**

1. Red blood cells: carries oxygen in haemoglobin to the cells.  
Adaptations include:
  - Biconcave: large surface area to bind to oxygen. Flexible shape allows it to squeeze through the capillaries.
  - No nucleus and no mitochondria: gives more space to carry oxygen.
  - Haemoglobin: has high affinity for oxygen and contains iron. Each red blood cell can bind up to 4 oxygen molecules to form oxyhaemoglobin.
  - Thin outer membrane: for quick diffusion of oxygen.
2. Plasma: transports dissolved glucose, nutrients, hormones and proteins to cells.
3. White blood cells: part of the immune system and important in protecting the body against pathogens. Contains phagocytes and lymphocytes. Phagocytes engulf and destroy pathogens whereas lymphocytes secrete antibodies and neutralise pathogens.
4. Platelets: for blood clotting.