

Circulatory System

The Lungs

Pathway of air: Mouth/nose → trachea → bronchus → bronchiole → alveoli

Oxygen diffuses from the alveoli into the blood.

Carbon dioxide diffuses from the blood to the alveoli.

Rate of blood flow

This is the volume of blood flowing per minute. To increase blood flow the heart can beat faster and/or contract more forcefully.

$$\text{Rate of blood flow} = \text{volume of blood} \div \text{number of minutes}$$

Adaptations of the Alveoli

Have a **large surface area** to increase the rate of diffusion.

A **large blood supply** maintains the concentration gradient.

Thin cell walls reduces the diffusion distance.

Blood

Red blood cells carry oxygen. They have a biconcave shape to increase their surface area. They do not have a nucleus so can carry more oxygen.

White blood cells defend against pathogens.

Platelets help the blood to clot. They are small fragments of cells that contain no nucleus.

Plasma is a liquid that carries everything including red and white blood cells, platelets, carbon dioxide, urea, hormones, proteins, antibodies and antitoxins.

Blood Vessels

Arteries carry blood away from the heart at high pressure. They have thick, elastic muscular walls to withstand this pressure.

Veins carry blood back to the heart. As the blood is at low pressure valves are needed to keep the blood flowing in the correct direction. They have thinner walls and a larger lumen than arteries.

Capillaries are the small blood vessels where gas exchange takes place. They have thin cell walls to decrease the diffusion pathway.

Cardiovascular Disease

Coronary heart disease happens when the arteries that supply blood to the heart get blocked by fatty deposits. This restricts the blood flow and can cause a heart attack.

Stents can be used to keep arteries open. They are a tube that is inserted into the artery.

Statins reduce cholesterol levels in the blood. Too much bad cholesterol can cause fatty deposits to build up in arteries. Statins reduce the amount of bad cholesterol.

Statins reduce the risk of strokes and heart attacks. However they must be taken regular long term and may cause side effects (head aches and liver damage).

The Heart – a double pump (left ventricle pumping to the body, right ventricle pumping to the lungs).

Pathway blood takes: Vena cava → right atrium → left atrium → pulmonary artery → lungs → pulmonary vein → left atrium → left ventricle → aorta → body