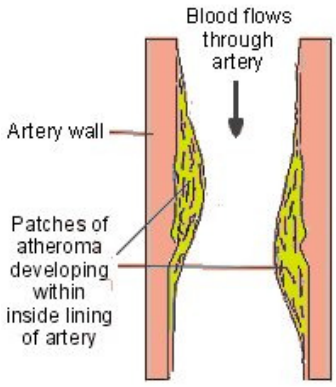
Biology Top-Up
Heart Disease, Blood Vessels & Blood



Cardiovascular diseases (CVD) affect the heart and blood vessels. Most of these start off as atheromas - fatty build ups on the walls of the blood vessels. These restrict blood flow and increase the risk of blood clots (thrombosis) forming. There are four common examples of CVD:

- High blood pressure - variety of causes; can lead to other CVD because of an increased risk of blood clots
- Stroke - caused by blood clots in the arteries supplying blood to the brain and brain damage occurs due to a lack of oxygen
- Coronary heart disease (CHD) - the coronary arteries that supply the heart muscle with oxygen get blocked, increasing the risk of blood clots
- Heart attack - the coronary arteries become completely blocked, damaging the muscle because of a lack of respiratory substrates. Also known as a myocardial infarction.

Blood vessels

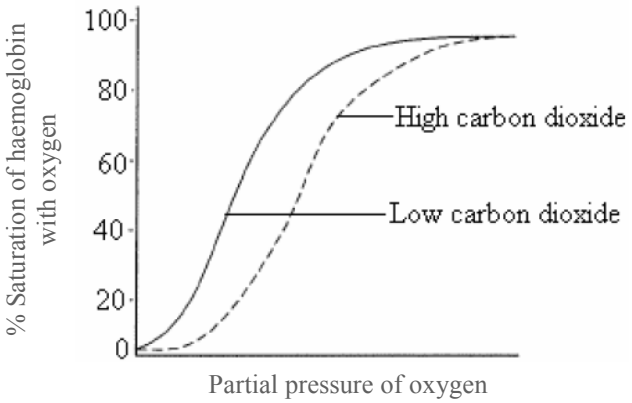
Arteries carry blood away from the heart. The walls of arteries consist of a thin, folded endothelium (inner layer), a thick layer of elastic tissue & smooth muscle and a fibrous outer layer. The elastic layer helps to maintain the blood pressure when the ventricles relax. Veins carry blood towards the heart, and have thinner walls and a larger lumen than arteries. They also have valves to maintain blood flow in one direction.

Arterioles are narrow arteries, and contain much more muscle fibre and less elastic tissue. This means that arterioles can control the flow of blood by contracting the muscle - less blood will flow through a smaller lumen.

Capillaries are microscopic blood vessels that are the site of exchange. The capillary wall is made up of a single layer of cells, meaning that any substances diffusing in or out only have a small distance to move. Blood also flows slowly though capillaries. There are many capillaries in the body, giving a massive surface area for diffusion to take place over.

Haemoglobin (Hb)

This is the red pigment in red blood cells. It is a protein that carries oxygen around the body by combining with it to form oxyhaemoglobin. In high O_2 concentrations, the Hb molecule will combine with four O_2 molecules and be 100% saturated (full).



CO_2 is produced by respiring tissues, which require a good supply of oxygen. Hb release oxygen much more easily when there are large amounts of CO_2 present, so the tissues which are respiring most will therefore cause oxygen to be released easiest. This is known as the Bohr effect, and is shown on the oxygen dissociation curve (graph) by a movement of the curve to the right.