

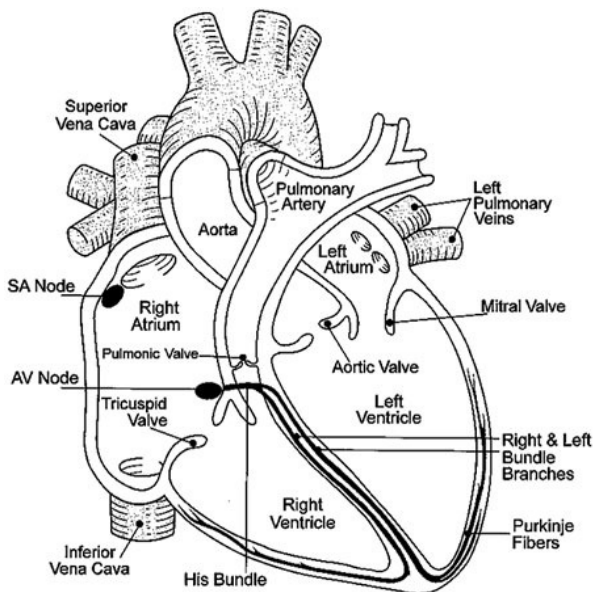
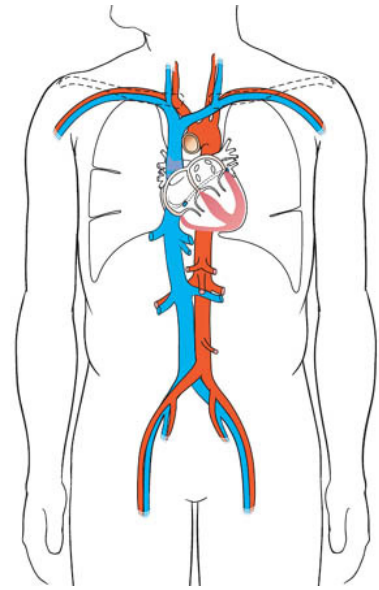
Biology Top-Up

The Heart

Diffusion is most efficient over short distances. Multicellular organisms (those with many cells) need to have some way of transporting the substances necessary for respiration to individual cells around the body.

Mammals have evolved a circulatory system that consists of the heart (a double pump system) and three main types of blood vessel:

- Arteries carry blood away from the heart
- Veins carry blood back to the heart
- Capillaries are small blood vessels linking arteries and veins. They are also the site of exchange of materials.



There are four chambers in the heart: two atria (s. atrium) and two ventricles. The left side of the heart receives blood from the lungs and pumps it around the body, the right side of the heart receives blood from the body and pumps it to the lungs.

The arrangement of the heart means that the atria do not need thick walls - they only pump the blood a short distance. The ventricles have to pump blood further, but still show a noticeable difference in the thickness of the walls. Due to the pressure necessary to pump blood around the entire

body, the left ventricle wall is much more muscular (and so thicker) than the right ventricle wall.

It is important to keep the flow of blood within the body moving in one direction. High blood pressure in the arteries (caused by the contraction of the ventricles) ensures that this is the case, but the pressure in the veins is much lower.

Valves are found in the heart and in veins to prevent backflow of blood. They open when the pressure is higher below them than above and vice versa. Because the beating of the heart does not have an effect on the pressure of blood in the veins, many of them run close to (or within) muscles. Muscle contraction increases the pressure inside the vein, forcing blood through the valves and back towards the heart.



Normal valve open



Normal valve closed