

B B C BITESIZE

Hello, I'm Dr Alex Lathbridge and this is Bitesize Biology.

This is the third episode of a six-part series on the organisation of plants and animals. In this episode we're going to talk about the circulatory system. We're looking at the structure of the heart and how it works, and we're finding out about the different types of blood vessels.

The circulatory system is the main transport system in humans. You can think of all the blood vessels as a big network of roads winding inside our body, and transporting food, oxygen, and waste to where it needs to go. It's got valves. They're kind of like road signs, they make sure everything goes in the right direction.

And key to all of this is one organ - the human heart.

The heart pumps blood around the body by contracting, this just means squeezing.

You can think of blood as the cars that speed around our roads, our blood vessels, transporting everything that our body needs. The heart constantly pumps the blood, keeping us alive.

The heart is made up of four chambers, with valves and important blood vessels transporting things in and out of it.

It's key that you understand the structure of the heart, and how blood flows through it, so grab a pen and let's draw a rough diagram so you know what each part of the heart is called and what it does.

And remember, this is important, for those diagrams, left and right refers to the side in a person's body, not how its viewed on the page. You can go to the Bitesize website and take a look.

Draw a heart shape and divide it into four. These are the four chambers of the heart.

Alright let's label them. The chambers in the top half of the heart are called the left atrium and the right atrium and the two chambers in the bottom half of the heart are called the left ventricle and the right ventricle.

On the right-hand side of our heart, the blood enters into the right atrium from a blood vessel called the vena cava.

On the left-hand side of heart, the blood enters into the left atrium from a blood vessel known as the pulmonary vein, so let's add that in.

The atria fill up with blood and then they contract, so the blood is pushed down into the bottom half

of the heart – the ventricles.

Then the ventricles contract which pushes the blood up and out of the heart.

On the left-hand side, blood leaves the heart by the aorta and goes to the rest of the body.

And on the right-hand side, blood leaves the heart by the pulmonary artery and that goes to the lungs.

This is the only direction of travel in the heart, blood is prevented from travelling backwards by the valves. There is a barrier between the left side and the right side of the heart, so the blood doesn't go between them.

A good way that I use to remember this, is by saying that the vessels that take blood into the heart are the veins. The vena cava and the pulmonary vein are veins, and the word "vein" ends in "in," veins take blood in.

The other way, the blood goes away from the heart by the blood vessels that begin with "A", the pulmonary artery and the aorta.

Time for a revelation, this going to blow your mind – the process is different on each side of the heart. The heart actually pumps blood through two separate circuits, so the circulatory system is really a double system, so you're going to need to know what each side does.

The right-hand side of the heart looks after pulmonary circulation.

Pulmonary just means lungs. This side pumps blood to the lungs for gas exchange. So oxygen moves from the lungs, into the blood and then that blood is now oxygenated.

This oxygenated blood then returns back to the heart. So really, pulmonary circulation is just a loop between the heart and lungs.

The heart's left-hand side looks after systemic circulation.

It pumps oxygenated blood to the rest of the body. So the blood carries oxygen to all the places in our body that it's needed – which is everywhere! It then gives up the oxygen, or drops it off, at the cells.

The blood is again now without oxygen again, so it gets called deoxygenated and goes back to the heart, and the heart pumps it round to the lungs again to pick up more oxygen, and so on and so forth!

Now if that sounds confusing, what you can do is draw for me a number eight. In the middle of that number eight, that's where the heart is. At the top are the lungs and at the bottom is the rest of the body. So that's how it all comes together. At the top you've got pulmonary circulation and at the bottom you've got systemic circulation.

The wall of the left-hand side of the heart has much thicker muscle than the right-hand side, as it

needs to pump blood much further around the whole body. The lungs and the heart are really close together, so it's not such a big job for the right-hand side.

And the final thing we're going to talk about at today is blood vessels – there are three different types of blood vessels and each are adapted for their function:

1. Arteries – these always carry blood away from the heart . Remember: “A for Arteries” and “A for away.” The heart pumps blood out at really high pressure, so they have to be very strong. Arteries are made of muscle and have thick, elastic walls. The middle space in arteries where blood flows is known as the lumen and its narrow.

2. Capillaries – these are tiny vessels where substances are exchanged. If we think of blood vessels as a road network, these would be the tiny driveways where cars park. They carry red blood cells close to the other cells in the body. Their special feature is that they have permeable walls, so that means they are really thin – they're only one cell thick, and that allows food and oxygen, and waste products like carbon dioxide, to diffuse in and out easily.

3. Veins – these carry blood back to the heart. The walls of veins are thin, they're much less muscly than arteries, because blood going back to the heart from the rest of the body, is under a lot less pressure. The Lumen, the middle part of the tube, inside veins is very large. As blood is travelling slower when it reaches the veins, they need to valves inside to ensure the blood keeps moving. It would not be good for the blood to start flowing backwards!

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