

EB Education Revision Guide



How to work with the Circulatory System: Part 2

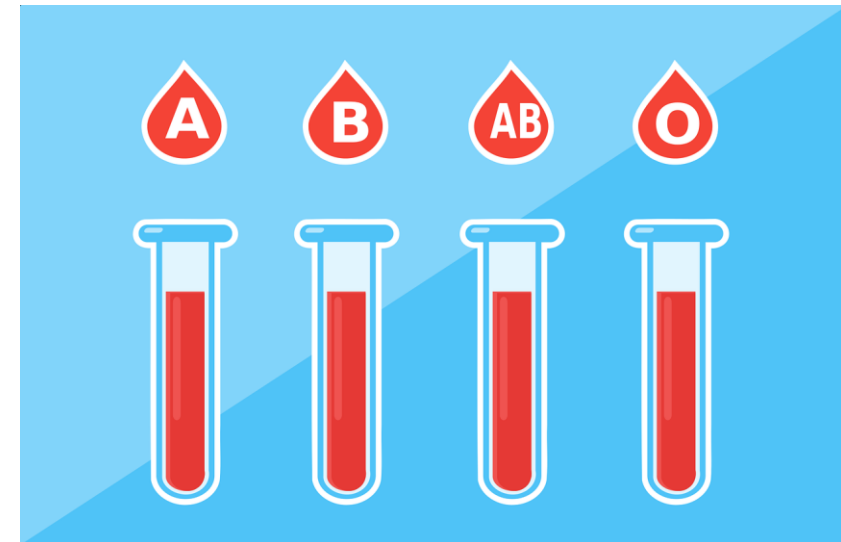
What is blood?

Blood is a liquid tissue consisting of four main components. It transports substances and heat around the body, and is involved in the immune response

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It consists of:

- Red blood cells
- White blood cells
- Plasma
- Platelets



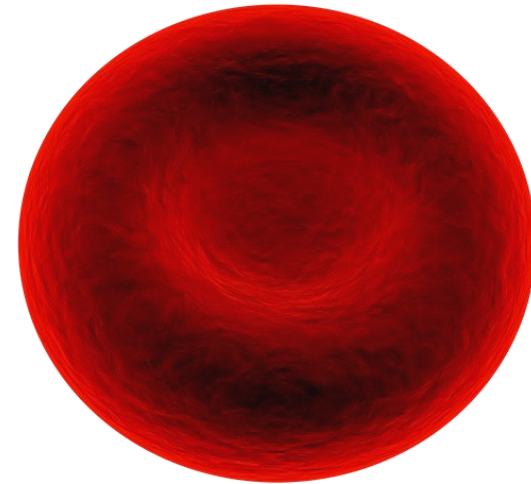
Red Blood Cells

What do they do?

Red blood cells (or **erythrocytes**) carry oxygen around the body, from the lungs to every cell.

They are biconcave in shape and have no nucleus in order to provide them with a large surface area to carry as much oxygen as possible.

They contain a red pigment called haemoglobin. Haemoglobin contains iron. The haemoglobin will bind to oxygen in the lungs to become oxyhaemoglobin. The oxygen is then released into cells as the red blood cells travel around the body.

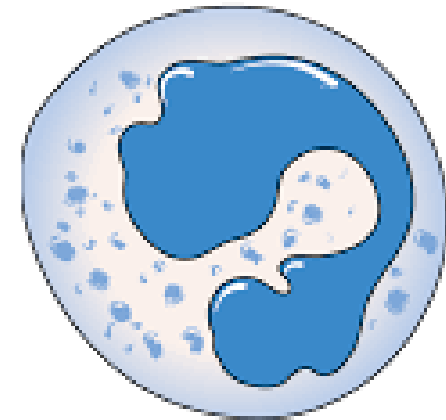


White Blood Cells

What do they do?

There are different types of white blood cell, and they help defend against infection.

- **Phagocytes** – these can change shape and engulf microorganisms in a process known as phagocytosis
- **Lymphocytes** – these produce antibodies which attach to microorganisms. They can also produce antitoxins.



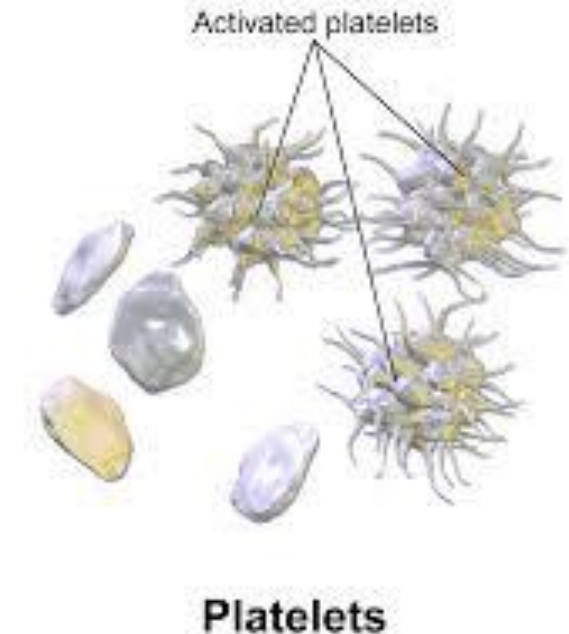
Platelets

What do they do?

Platelets are tiny fragments of cells, and they do not have a nucleus.

They help the blood to clot if you have been cut, preventing blood pouring out of your body and microorganisms getting in.

If you do not have enough platelets, it can result in excessive bleeding and bruising.



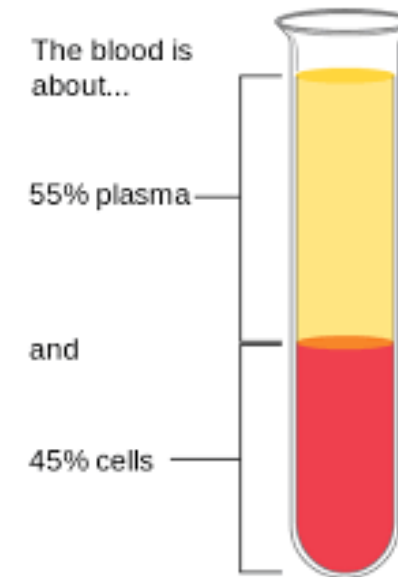
Plasma

What does it do?

Plasma is a straw-coloured liquid that carries everything in the blood.

All these are transported in the plasma:

- Red blood cells
- White blood cells
- Platelets
- Oxygen (from lungs to cells)
- Carbon dioxide (from cells to the lungs)
- Hormones
- Antibodies and antitoxins
- Nutrients (like glucose, amino acids)
- Urea (from the liver to the kidneys)



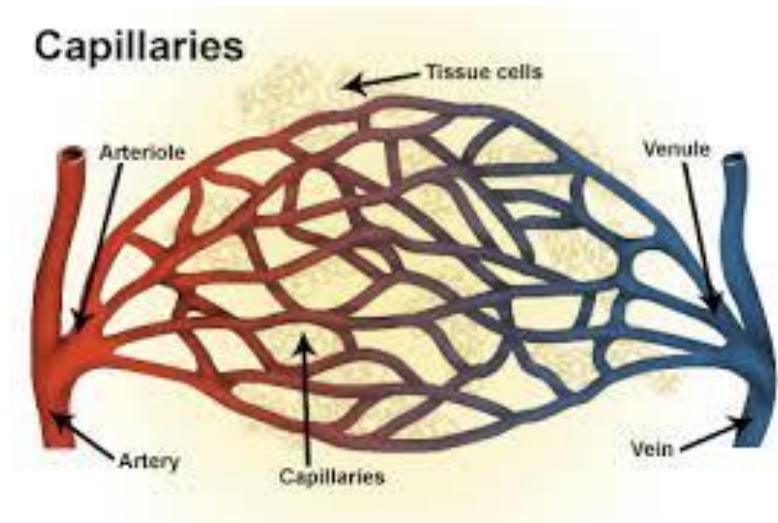
Blood vessels

What are they?

Blood vessels carry the blood around your body.

There are three different types of blood vessel you need to know:

- Arteries
- Veins
- Capillaries

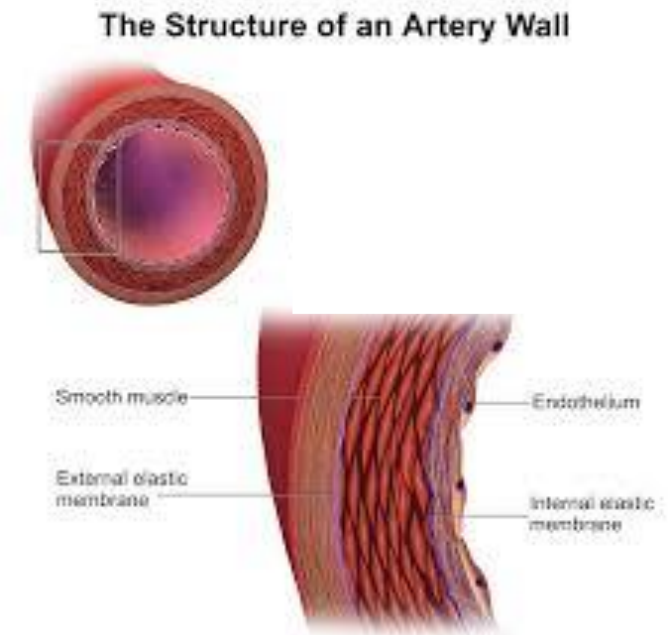


Structure of arteries

Arteries carry blood away from the heart.

Artery walls are strong and elastic with thick muscular tissue because the blood is being pumped through them at high pressure.

The layers of muscle makes them strong and elastic tissue allows them to stretch and spring back into shape.



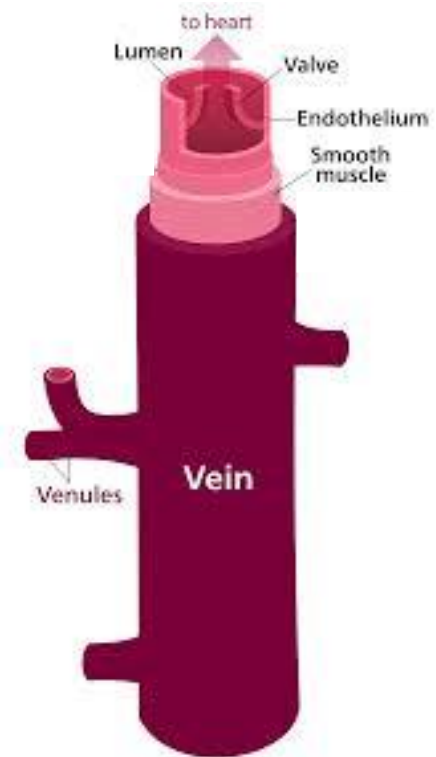
Structure of veins

Veins carry blood back to the heart.

The walls of veins are thinner and less muscular than the arteries because the blood travels at a lower pressure through veins.

The veins have a large lumen allowing more blood to flow.

There are valves inside the veins to stop blood flowing backwards under low pressure.



Capillaries

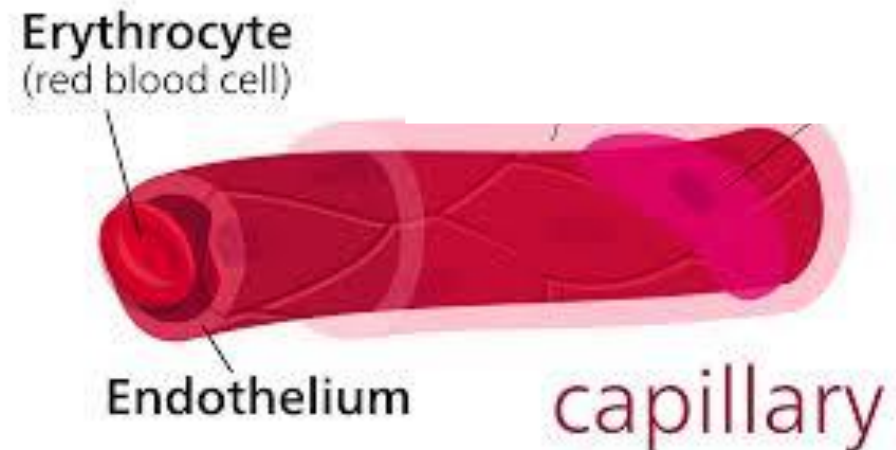
Structure of capillaries

Capillaries are very small and narrow so they can fit into gaps between cells.

This means that blood can reach every cell in the body to allow for exchange of substances.

The walls of capillaries are permeable, and only one cell thick so that substances can easily diffuse in and out.

Substances like oxygen and glucose travel from the blood into cells, and waste products such as carbon dioxide travel out of cells and into the blood.



Your turn:

1. Describe the differences between arteries and veins.

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2. Explain how red blood cells are able to transport oxygen around the body efficiently.

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Your turn:

3. The table below lists a series of statements.
State in the box whether each statement is about
arteries, veins or capillaries.

Statement	Arteries, veins or capillaries
Are in close contact with cells of the body	
Carry blood at high pressure	
Have valves	
Have a thick muscular wall	
Usually carry blood with a high oxygen concentration	
Allows substances to pass through their walls and into cells	
Usually carry blood with a high carbon dioxide concentration to the heart	
Carry blood away from organs	
Supply the heart muscle with oxygen	
Collect oxygen from alveoli in the lungs	
Walls are one cell thick	

Your turn

4. Blood plasma transports molecules around the body. What does it transport?

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Answers:

1. Describe the differences between arteries and veins.

Arteries have a thick wall of muscular and elastic tissue, while the layers in the walls of veins are thinner.
Arteries have a narrow lumen and veins have a wide lumen.
Blood in arteries is pumped under high pressure, while blood in veins travels at low pressure.
Veins have valves to prevent the back flow of blood and arteries do not.
Arteries take blood away from the heart, while veins take blood back to the heart.
Arteries transport oxygenated blood, except for the pulmonary artery, while veins transport deoxygenated blood, except for the pulmonary vein.

2. Explain how red blood cells are able to transport oxygen around the body efficiently.

They contain haemoglobin that combines with oxygen to make oxyhaemoglobin.
They have no nucleus so more haemoglobin can fit in.
They are small and flexible so that they can fit through narrow blood vessels.
They are biconcave in shape to provide a larger surface area to carry more oxygen.

Answers:

3. The table below lists a series of statements.
State in the box whether each statement is about
arteries, veins or capillaries.

Statement	Arteries, veins or capillaries
Are in close contact with cells of the body	Capillaries
Carry blood at high pressure	Arteries
Have valves	Veins
Have a thick muscular wall	Arteries
Usually carry blood with a high oxygen concentration	Arteries
Allows substances to pass through their walls and into cells	Capillaries
Usually carry blood with a high carbon dioxide concentration to the heart	Veins
Carry blood away from organs	Veins
Supply the heart muscle with oxygen	Arteries
Walls are one cell thick	Capillaries

4. Blood plasma transports molecules around the body. What does it transport?

Glucose/amino acids (or other nutrients)

Oxygen and Carbon Dioxide

Hormones

Antibodies and antitoxins

White/red blood cells and platelets

Urea

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