

Blood vessels

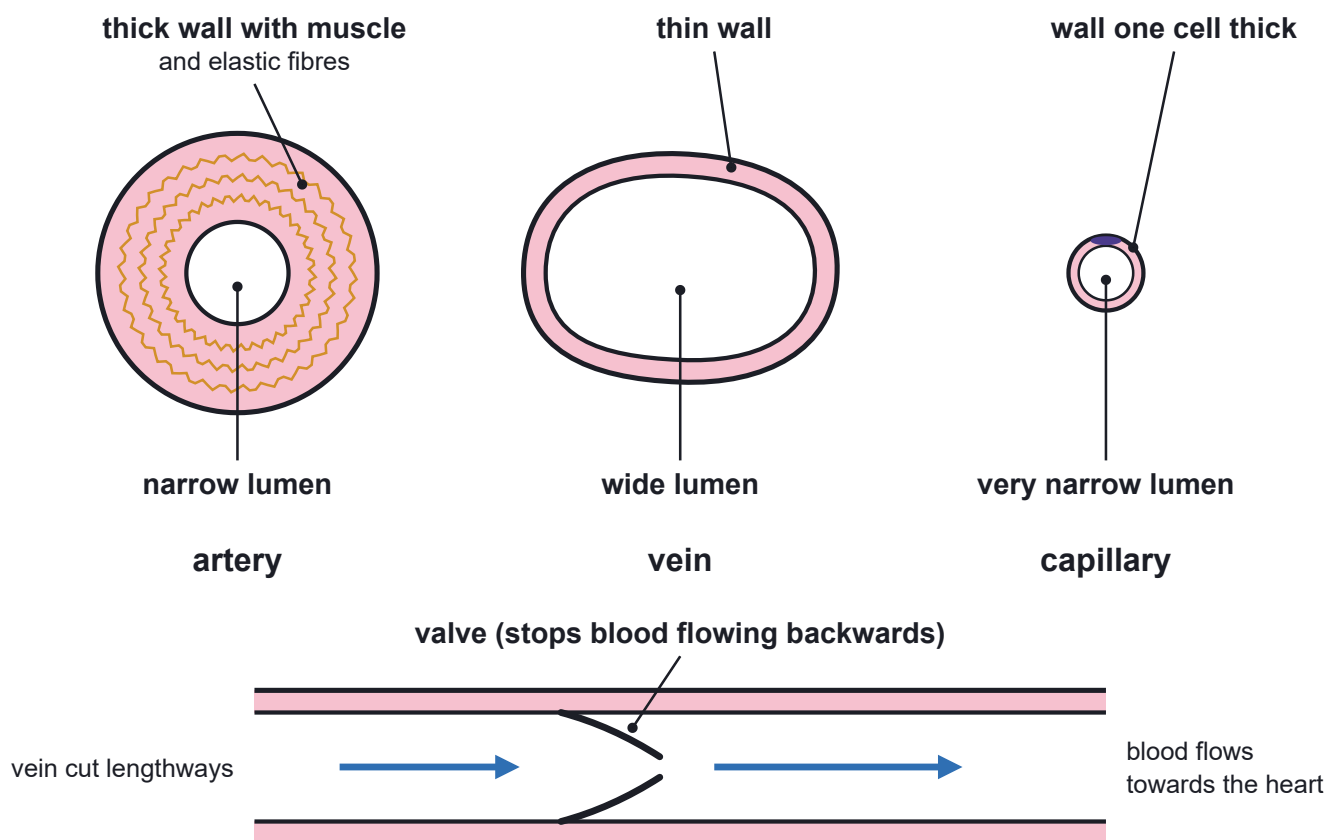
Revision notes · The structure and functions of arteries, veins and capillaries, and the main blood vessels to and from the heart, lungs, kidneys and liver.

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Blood vessels Spec 9.3

Arteries, veins and capillaries Spec 9.3.1, 9.3.2, 9.3.4, 9.3.5

Structure of blood vessels			
Vessel	Wall	Lumen	Valves
Artery	Thick	Narrow	No
Vein	Thin	Wide	Yes
Capillary	One cell thick	Very narrow	No



Arteries have thick walls, veins have a wide lumen and valves, capillaries have walls one cell thick. (The capillary is drawn much larger than its real size.)

Capillaries are the site of exchange. They allow substances such as oxygen, glucose and carbon dioxide to pass between the blood and the cells of the body tissues.

Supplement

Structure related to pressure

Supplement

- **Arteries** carry blood away from the heart at high pressure. Their thick walls, containing muscle and elastic fibres, withstand the pressure and stretch and recoil with each beat. The narrow lumen helps to maintain the pressure.
- **Veins** carry blood back to the heart at low pressure. They need only thin walls, and the wide lumen gives little resistance to flow. Valves stop the blood flowing backwards.

Supplement

Structure of capillaries related to function

Supplement

- Walls are **one cell thick**, giving a short distance for diffusion.
- Walls are **permeable**, so substances in the blood plasma can leak out and pass in.
- They are very narrow and form a large network (large surface area) close to every cell, and the slow flow gives time for exchange.

Supplement

Exam tip: Do not say that veins have 'no muscle'. Say their walls are thinner because the blood is at lower pressure.

The main blood vessels Spec 9.3.3, 9.3.6

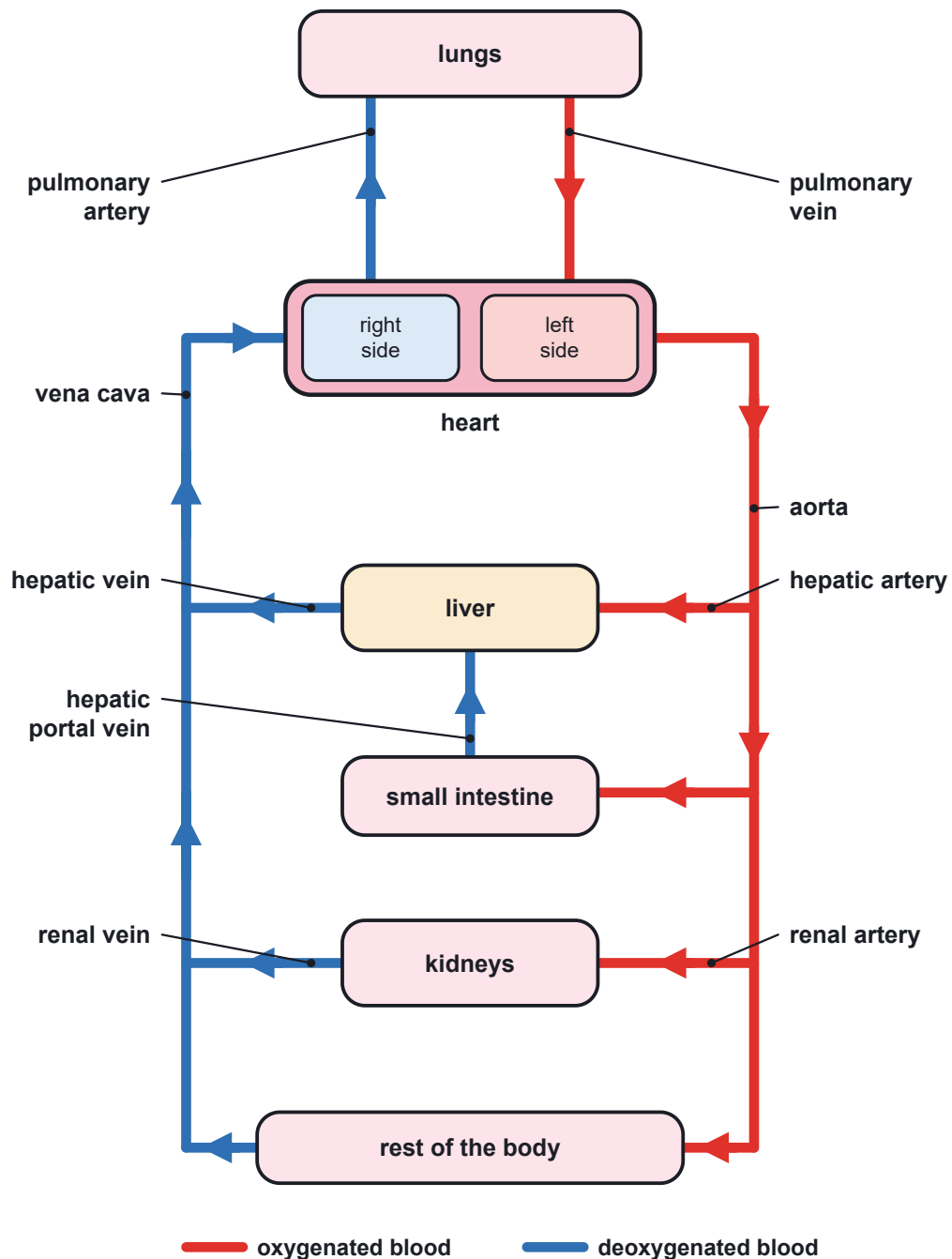
Main blood vessels		
Vessel	Carries blood	Oxygen content
Vena cava	From the body to the right atrium	Deoxygenated
Pulmonary artery	From the right ventricle to the lungs	Deoxygenated
Pulmonary vein	From the lungs to the left atrium	Oxygenated
Aorta	From the left ventricle to the body	Oxygenated
Renal artery	From the aorta to the kidney	Oxygenated
Renal vein	From the kidney to the vena cava	Deoxygenated; contains less urea than the blood in the renal artery

Supplement

Blood vessels of the liver

Supplement

- **Hepatic artery**: brings oxygenated blood to the liver.
- **Hepatic portal vein**: brings blood from the small intestine, carrying absorbed nutrients, to the liver.
- **Hepatic veins**: take blood away from the liver to the vena cava.



The main blood vessels. The hepatic artery, hepatic portal vein and hepatic vein are Supplement content.

Common mistake: Arteries do not always carry oxygenated blood. The pulmonary artery carries deoxygenated blood and the pulmonary vein carries oxygenated blood. Artery or vein depends on the direction relative to the heart.

Quick check

1. Which blood vessels have valves?
2. State the function of capillaries.
3. **Supplement** Why do arteries have thick walls?
4. Name the blood vessel that carries blood from the lungs to the heart.
5. **Supplement** Which vessel carries blood from the small intestine to the liver?

Quick check answers

Blood vessels

1. Veins.
2. Exchange of substances between the blood and the cells of the body tissues.
3. They carry blood at high pressure, so the walls must withstand it.
4. Pulmonary vein.
5. The hepatic portal vein.