

Transport in Animals

IGCSE Biology ■ Topic 9

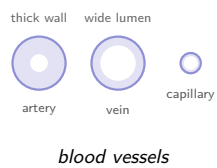
IGCSE Biology



Transport in Animals

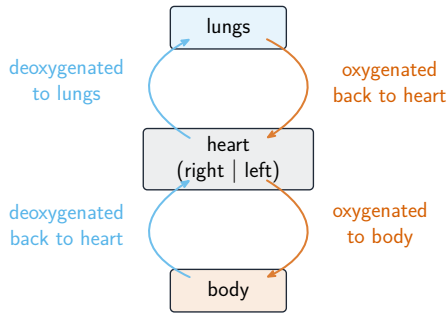
What we will cover

- 1 Single & double circulation
- 2 The heart
- 3 Heart rate & disease
- 4 Blood vessels
- 5 Blood & its defence



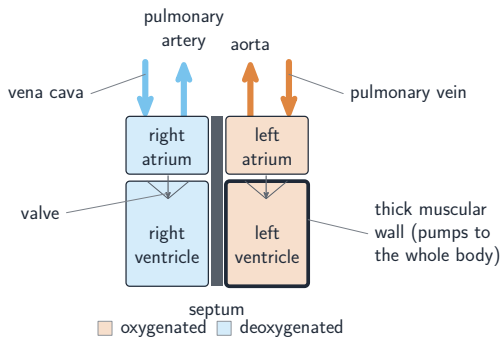
1 Heart and circulation

Single and double circulation



- A fish has a **single circulation** 单循环: the blood passes through the heart **once** on each trip around the body.
- A **mammal** 哺乳动物 has a **double circulation** 双循环: the blood passes through the heart **twice** on each full trip – once on the...
- The advantage of a double circulation: the blood can be pumped again at **high pressure** 压力 before going to the body.

The heart



Four chambers: two **atria** 心房 (top) & two **ventricles** 心室 (bottom), split by the **septum** 隔膜.

- left ventricle wall is **thickest** (pumps to the whole body)
- valves stop backflow

Heart rate and disease

exercise

heart rate 心率 rises, so blood reaches muscles faster with O₂ & glucose

coronary heart disease 冠心病

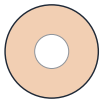
coronary arteries narrow; risks: fatty diet, smoking, no exercise

2

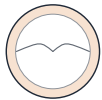
Vessels and blood

Transport in Animals
└ Vessels and blood

Blood vessels



artery
thick muscular,
elastic wall;
narrow lumen;
high pressure



vein
thin wall;
wide lumen;
has **valves**;
low pressure



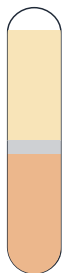
capillary
wall one cell
thick; lets
substances be
exchanged

- **arteries** 动脉 – thick, **away** at high pressure
- **veins** 静脉 – thin, wide, **valves** 瓣膜, back
- **capillaries** 毛细血管 – one cell thick; exchange

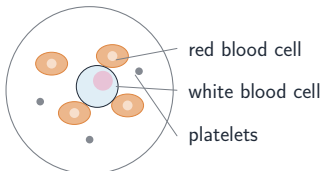
Main: **aorta** 主动脉/**vena cava** 腔静脉, pulmonary, renal.

Transport in Animals
└ Vessels and blood

Blood



plasma
white cells
+ platelets
red cells



red blood cell
white blood cell
platelets

- **red cells** 红细胞 – carry O_2 via **haemoglobin** 血红蛋白
- **white cells** 白细胞 – defence
- **platelets** 血小板 – **clotting** 凝血
- **plasma** 血浆 – carries everything else

Defence and clotting

white blood cells
phagocytes 吞噬细胞 engulf **pathogens** 病原体;
lymphocytes 淋巴细胞
make **antibodies** 抗体

clotting
fibrinogen 纤维蛋白原 →
fibrin 纤维蛋白 threads
trap cells & seal the wound

3

Recap

Worked example – why is one wall thicker?

Explain why the left ventricle wall is much thicker than the right.

- The **right** ventricle pumps blood only to the **lungs** – a short trip, and delicate capillaries.
- Too high a pressure would **damage** them.
- The **left** ventricle pumps to the **whole body**, a much longer distance.
- A thicker **muscle** wall contracts harder ⇒ **higher pressure**.

Thicker wall = more **muscle** = more force = higher pressure. Say **muscle**, and say **how far the blood must travel**.

Topic 9 – key takeaways

1 Double

blood passes the heart twice each trip

2 Heart

left ventricle is thickest; valves stop backflow

3 Vessels

arteries away, veins back, capillaries exchange

4 Blood

red O_2 , white defence, platelets clot, plasma

Check yourself

- 1 Why is the left ventricle wall the thickest?
- 2 Which vessel carries blood away from the heart?
- 3 What pigment lets red cells carry oxygen?
- 4 How do lymphocytes fight pathogens?



Answers 1. it pumps blood to the whole body 2. an artery 3. haemoglobin 4. they make antibodies