

8 Transport in mammals – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
oxygen	氧气	_____	_____	_____
haemoglobin	血红蛋白	_____	_____	_____
atria	心房	_____	_____	_____
ventricles	心室	_____	_____	_____
sinoatrial node	窦房结	_____	_____	_____
pacemaker	起搏点	_____	_____	_____
atrioventricular node	房室结	_____	_____	_____
Purkyne tissue	浦肯野组织	_____	_____	_____
oxygen dissociation curve	氧解离曲线	_____	_____	_____
saturation	饱和度	_____	_____	_____
partial pressure	分压	_____	_____	_____
carbon dioxide	二氧化碳	_____	_____	_____
Bohr shift	波尔位移	_____	_____	_____

Recall

From Part 1 you know the heart is a double pump. Here we look inside it, and at how the blood carries **oxygen** 氧气.

- The heart has four chambers (you met them at IGCSE).
- Oxygen is carried by **haemoglobin** 血红蛋白 in the red blood cells.

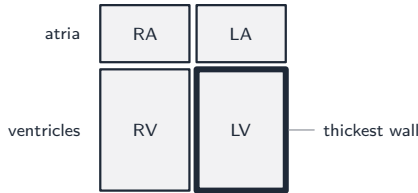
New ideas

Read these first, then do the Practice.

■ 1 The four chambers

The two upper chambers are the **atria** 心房 (thin walls — they only push blood to the chambers below). The two lower chambers are the **ventricles** 心室 (thick muscular walls — they pump blood out).

The **left ventricle** wall is the thickest, because it pumps blood all the way round the **body**, while the right side only pumps to the nearby **lungs**.



■ 2 Controlling the heartbeat

The heart sets its own rhythm:

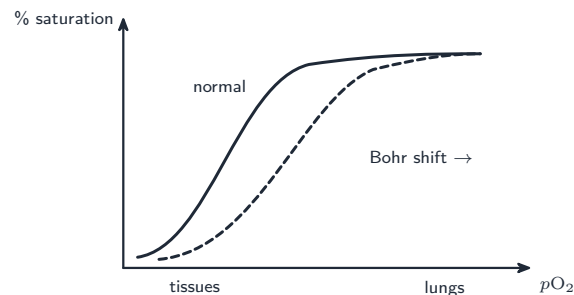
- the **sinoatrial node** 窦房结 (SAN) is the **pacemaker** 起搏点; it starts each beat and makes the atria contract.
- the **atrioventricular node** 房室结 (AVN) passes the signal on, after a short delay so the atria empty first.
- the **Purkyne tissue** 浦肯野组织 carries the signal down the ventricle walls so they contract from the bottom up.

■ 3 Carrying oxygen

Haemoglobin 血红蛋白 in the red blood cells carries oxygen. The **oxygen dissociation curve** 氧解离曲线 (an S-shape) plots **saturation** 饱和度 (how full of oxygen) against the **partial pressure** 分压 of oxygen:

- where oxygen is **high** (lungs), haemoglobin loads up and becomes almost full.
- where oxygen is **low** (active tissues), haemoglobin unloads its oxygen.

When tissues are active they release **carbon dioxide** 二氧化碳, which makes haemoglobin give up oxygen more easily — the curve shifts right. This is the **Bohr shift** 波尔位移.



Watch out: the *left* ventricle wall is thickest because it pumps to the whole body. The SAN is the pacemaker; the AVN delay lets the atria empty first. On the dissociation curve, high oxygen (lungs) → haemoglobin loads; low oxygen (active tissues) → it unloads.

Practice

Try these in order.

8.1 Name (a) the two upper chambers, (b) the two lower chambers of the heart. [2]

8.2 Explain why the left ventricle wall is thicker than the right. [2]

8.3 Which part of the heart acts as the pacemaker? [1]

8.4 The atrioventricular node delays the signal for a moment. Explain why this delay is useful. [2]

8.5 Using the oxygen dissociation curve, describe what haemoglobin does where the partial pressure of oxygen is (a) high, (b) low. [2]

8.6 What is the Bohr shift? [1]

8.7 Challenge. During exercise, muscles release more carbon dioxide. Using the Bohr shift, explain how this helps the muscles get more oxygen. [2]