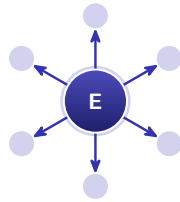


Respiration

IGCSE Biology ■ Topic 12

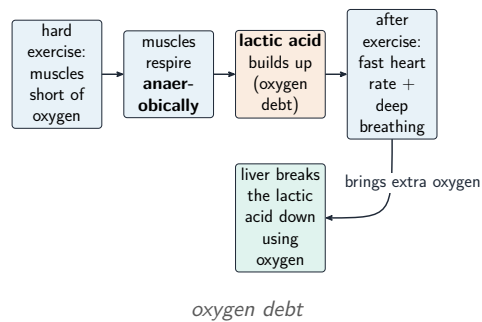
IGCSE Biology



Respiration

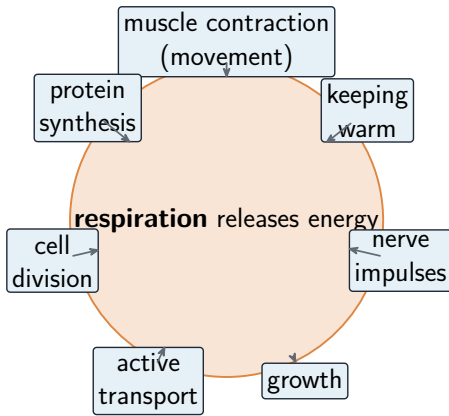
What we will cover

- 1 Respiration & energy
- 2 Aerobic respiration
- 3 Anaerobic respiration
- 4 Oxygen debt



1 Energy

Respiration and energy



- **muscle** 肌肉 contraction (movement).
- **protein synthesis** 蛋白质合成 (building proteins).
- **cell division** 分裂 (making new cells).
- **active transport** 主动运输.

2 Aerobic and anaerobic

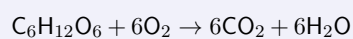
Aerobic respiration



Aerobic respiration releases energy steadily for sustained exercise.

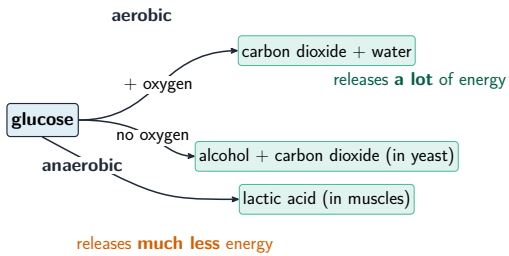
Word equation:

glucose + oxygen → carbon dioxide + water



Aerobic respiration releases a...

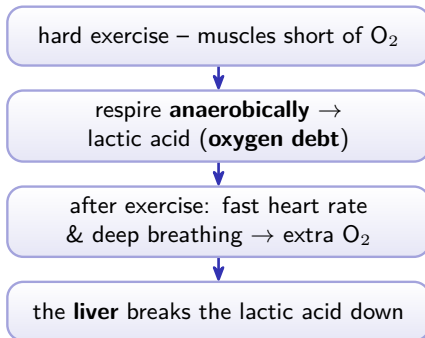
Anaerobic respiration



Anaerobic respiration 无氧呼吸 works **without** oxygen, giving **much less** energy.

- yeast: glucose → **alcohol** 酒精 + CO₂
- muscle: glucose → **lactic acid** 乳酸

Oxygen debt



Lactic acid builds up – the **oxygen debt** 氧债.

After exercise: a fast heart rate & deep breathing bring extra O₂, so the **liver** 肝脏 breaks the lactic acid down.

3

Recap

Worked example – aerobic or anaerobic?

A sprinter's muscles ache after a 200 m race. Explain what happened.

- Sprinting needs energy **faster** than the blood can deliver oxygen.
- So muscles also respire **anaerobically** 无氧地: glucose → **lactic acid** (+ a little energy).
- Lactic acid **builds up** in the muscle, causing the ache and fatigue.
- Afterwards you keep panting to repay the **oxygen debt** and break the lactic acid down.

Aerobic: glucose + oxygen → CO₂ + water, **lots** of energy. Anaerobic in muscle: glucose → lactic acid, **little** energy, no oxygen needed.

Topic 12 – key takeaways

1 Respiration

releases energy in all cells, all the time

2 Aerobic

glucose + O₂ → CO₂ + water;
lots of energy

3 Anaerobic

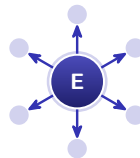
no O₂; alcohol (yeast) or lactic acid

4 Oxygen debt

repaid; liver breaks down lactic acid

Check yourself

- 1 Where in the body does respiration happen?
- 2 What are the products of aerobic respiration?
- 3 What does anaerobic respiration make in muscles?
- 4 Which organ breaks down lactic acid?



Answers 1. in every living cell 2. carbon dioxide & water 3. lactic acid 4. the liver