

Diseases & Immunity

IGCSE Biology ■ Topic 10

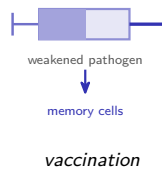
IGCSE Biology



Diseases & Immunity

What we will cover

- 1 Pathogens & transmission
- 2 The body's defences
- 3 Antigens & antibodies
- 4 Vaccination
- 5 Active vs passive immunity
- 6 Cholera



1 Disease and defence

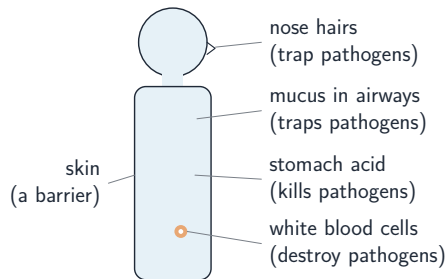
Pathogens and transmission



indirect: through food, water or air

- by **direct contact** 直接接触 – for example through blood and other **body fluids** 体液.
- indirectly – for example from **contaminated** 污染 surfaces, food, animals, or the air.

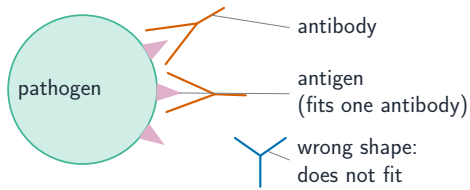
The body's defences



- **skin** – a barrier that covers and protects the body.
- **hairs in the nose** – trap dust and pathogens in the air you breathe in.
- **mucus** 黏液 – sticky liquid in the airways that traps pathogens.
- **stomach acid** 胃酸 – kills most pathogens in your food.

2 Immunity

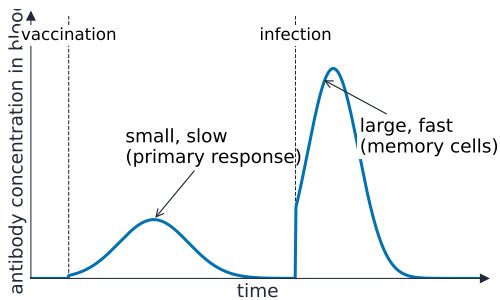
Antigens and antibodies



Each pathogen carries
antigens 抗原.
Lymphocytes 淋巴细胞 make
antibodies 抗体 (proteins).

An antibody's shape is **complementary** 互补 to one antigen – it fits only that pathogen.

Vaccination



Vaccination 疫苗接种 puts in weakened pathogens/antigens.

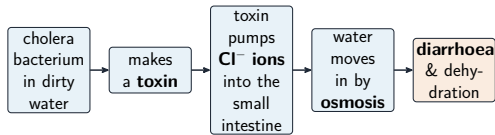
- lymphocytes make antibodies
- **memory cells** 记忆细胞 stay for years
- next time: a fast, large response

Active vs passive immunity

active immunity 主动免疫
your own antibodies (infection/vaccine); **memory cells** → long-term

passive immunity 被动免疫
antibodies from another (placenta, breast milk);
no memory → short-term

Cholera



Cholera 霍乱 spreads in dirty water. Its **toxin** 毒素:

- pumps chloride ions into the gut
- water follows by **osmosis** 渗透
- → **diarrhoea** 腹泻 & **dehydration** 脱水

3 Recap

Worked example – active or passive immunity?

A traveller is given an injection of ready-made antibodies. Is this active or passive immunity, and how long does it last?

- The antibodies were **not made by the traveller** – they were given.
- So it is **passive immunity** 被动免疫: protection starts **immediately**.
- But no **memory cells** are made.
- When the antibodies break down the protection is gone ⇒ **short-lived**.

Active: you make your own antibodies (vaccine or infection) – slow to start, **long-lasting** (memory cells). **Passive:** given to you – instant, **short**.

Topic 10 – key takeaways

1 Defences

skin, mucus, stomach acid, white cells

2 Antibodies

complementary shape to one antigen

3 Immunity

active makes memory cells;
passive does not

4 Cholera

toxin → osmosis → diarrhoea

Check yourself

- 1 Name two of the body's defences.
- 2 What cell makes antibodies?
- 3 Which immunity makes memory cells?
- 4 Why does cholera cause water loss?



Answers 1. e.g. skin & stomach acid 2. a lymphocyte 3. active immunity 4. water moves into the gut by osmosis