Exercise walk-through

3.2 Defence systems, vaccination and drugs (4.3.1.6–4.3.1.9, RP2 antiseptics)

AQA · GCSE · Biology

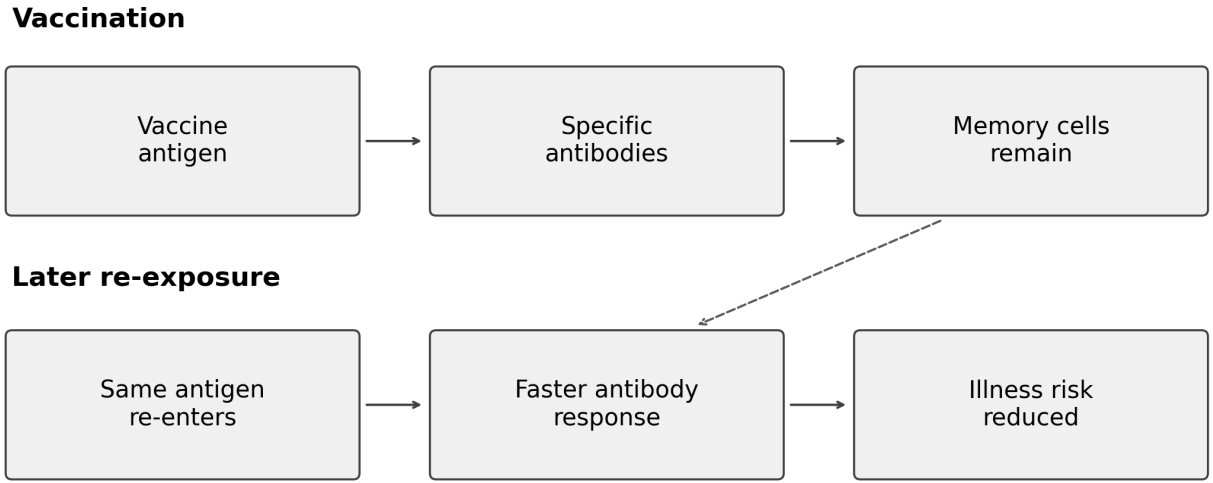
The body's defences

- The skin is a barrier, and scabs seal cuts.
- Hairs and **mucus** in the nose trap particles.
- In the trachea and bronchi, **mucus** traps pathogens and tiny hairs called **cilia** sweep it up to the throat, where it is swallowed.

The body's defences (2)

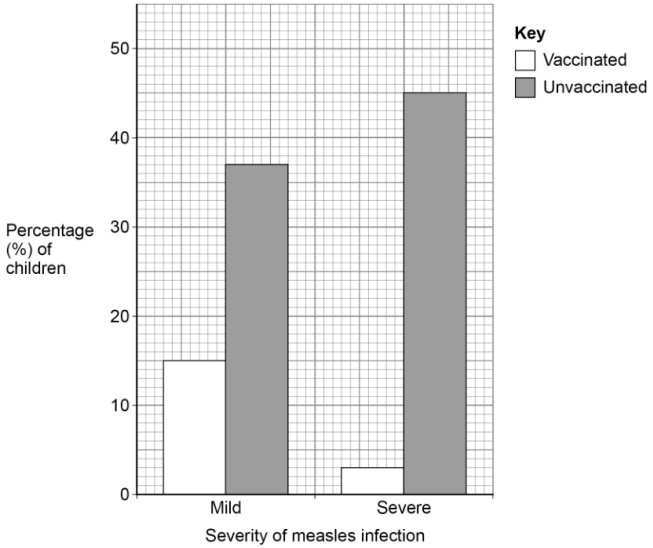
- **Hydrochloric acid** in the stomach kills most pathogens in food and drink.
- **phagocytosis** : some **white blood cells** engulf pathogens and digest them;
- **antibody production** : some make antibodies, proteins that fit a particular **antigen** on the pathogen's surface, sticking pathogens together and marking them for destruction;
- **antitoxin production** : some make antitoxins, which neutralise the **toxins** released by **bacteria**.

Figure: The body's defences



- After **vaccination**, **memory cells** make antibodies faster and in larger amounts when the pathogen returns
- Match each part of the diagram to the text.

Figure: The body's defences (2)



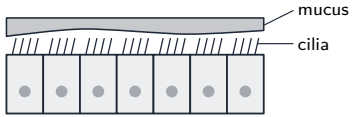
- Measles severity in vaccinated and unvaccinated children, as percentages of all 240 children surveyed (AQA GCSE Biology Paper 1H, June 2025, Figure 1)
- Read the axes and units first.

Antibiotics, painkillers and new drugs

- **Antibiotics** , such as penicillin, kill **bacteria** inside the body.
- Each one works on particular bacteria, so doctors must choose the right one.
- **Antibiotics** do not affect **viruses**, which live inside our cells, so they cannot cure a cold or flu. **Painkillers** such as paracetamol relieve symptoms but do not kill pathogens.
- **Antibiotic resistance.** A random **mutation** can make one bacterium resistant to an antibiotic.

Exercises 2.1·2.2

2.1 The diagram shows cells lining the trachea. Describe how they stop pathogens reaching the lungs. [2]

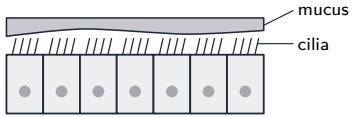


2.2 The diagram shows a white blood cell and a bacterium. Name the process shown. Give **one** other way white blood cells destroy pathogens. [2]



Exercises 2.1·2.2

2.1 The diagram shows cells lining the trachea. Describe how they stop pathogens reaching the lungs. [2]



2.1

- mucus (made by goblet cells) traps pathogens; cilia move the mucus up to the throat, where it is swallowed

2.2 The diagram shows a white blood cell and a bacterium. Name the process shown. Give **one** other way white blood cells destroy pathogens. [2]

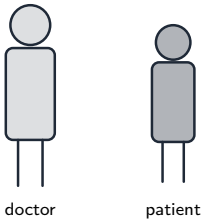


2.2

- **phagocytosis**; any one: making antibodies; making antitoxins

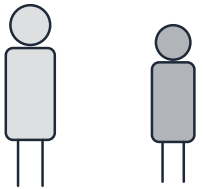
Exercise 2.3

2.3 A person with flu asks the doctor for antibiotics. Explain why the doctor says no. [2]



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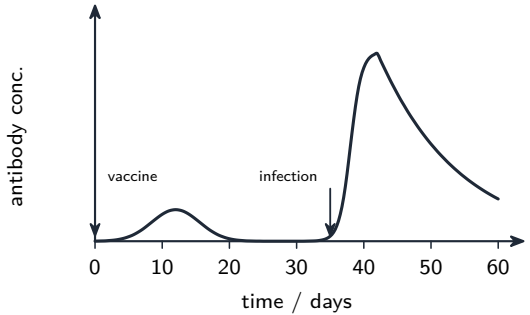


2.3

- flu is caused by a virus; antibiotics kill bacteria, not viruses (which live inside cells)

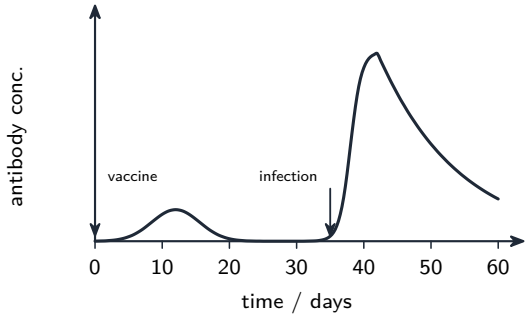
Exercise 3.1

3.1 The graph shows the antibody level in a person's blood after a vaccination (day 0) and after infection with the same pathogen (day 35). Explain the difference between the two responses. [3]



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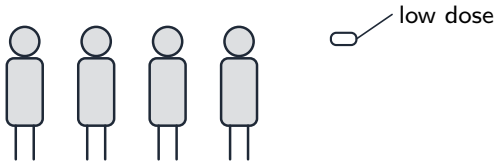


3.1

- the second response is faster and much bigger
- the vaccine made memory cells form
- so antibodies are made quickly and the pathogen is destroyed before the person feels ill

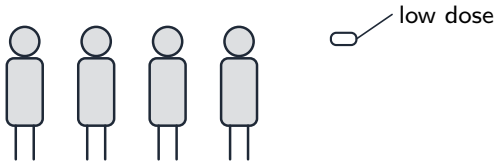
Exercise 3.2

3.2 Explain why a new drug is first given to healthy volunteers at a very low dose. [3]



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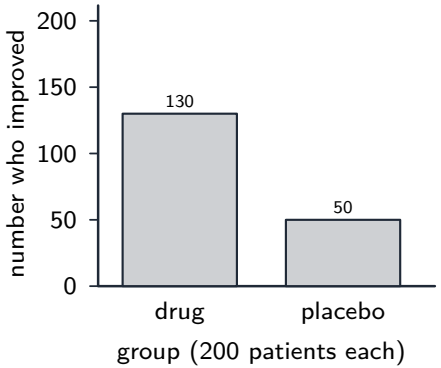
3.2

- to check that the drug is safe and find side effects
- a low dose in case the drug is harmful
- later trials on patients test how well it works and find the best dose

Exercise 3.3 (a)

3.3 A new drug for high blood pressure is tested in a double-blind trial. 200 patients take the drug and 200 patients take a placebo. The bar chart shows how many patients in each group had a large fall in blood pressure.

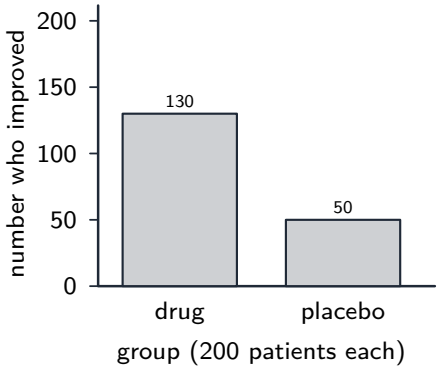
(a) Calculate the percentage of patients who improved in each group. [2]



Exercise 3.3 (a)

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(a) Calculate the percentage of patients who improved in each group. [2]



(a) drug: $\frac{130}{200} \times 100 = \mathbf{65}\%$; placebo: $\frac{50}{200} \times 100 = \mathbf{25}\%$

Exercise 3.3 (b)

3.3 A new drug for high blood pressure is tested in a double-blind trial. 200 patients take the drug and 200 patients take a placebo. The bar chart shows how many patients in each group had a large fall in blood pressure.

(b) Explain what a placebo is and why one is used in this trial. [3]

Exercise 3.3 (b)

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(b) Explain what a placebo is and why one is used in this trial. [3]

(b) a tablet that looks the same but has no drug in it; a control for comparison; some patients improve just because they think they are treated

Exercise 3.3 (c)

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(c) Explain why the trial is double-blind. [2]

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(c) Explain why the trial is double-blind. [2]

(c) neither the patients nor the doctors know who has the drug; so their expectations cannot bias the results

Exercise 3.3 (d)

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(d) Describe how a new drug is developed, from discovery to being given to patients by doctors. [6]

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(d) Describe how a new drug is developed, from discovery to being given to patients by doctors. [6]

(d) points to include:

- a drug is found in a plant or microorganism, or made by chemists
- tested on cells, tissues and animals for toxicity, efficacy and dose
- clinical trials: low doses on healthy volunteers to check safety
- then double-blind trials on patients, with a placebo, to find the best dose
- results are peer reviewed; only a safe drug that works is licensed

Levels: **5–6** a full, logical answer with correct biology and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.