

Drugs revision notes

A drug is any substance taken into the body that changes the chemical reactions in the body. This topic looks at antibiotics, the drugs used to treat bacterial infections, and at how resistant bacteria such as MRSA arise and how careful use of antibiotics can limit them.

For Cambridge IGCSE Combined Science 0653, **Supplement** is Extended content, only examined on Papers 2 and 4.

1 Drugs Spec B13.1

Drugs and antibiotics Spec B13.1.1, B13.1.2, B13.1.3, B13.1.4

Drug	Any substance taken into the body that modifies or affects chemical reactions in the body.
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Drugs include medicines, such as painkillers and antibiotics, but also substances such as caffeine and alcohol. What they have in common is that once they are in the body they **modify or affect chemical reactions** in the body.

Antibiotics

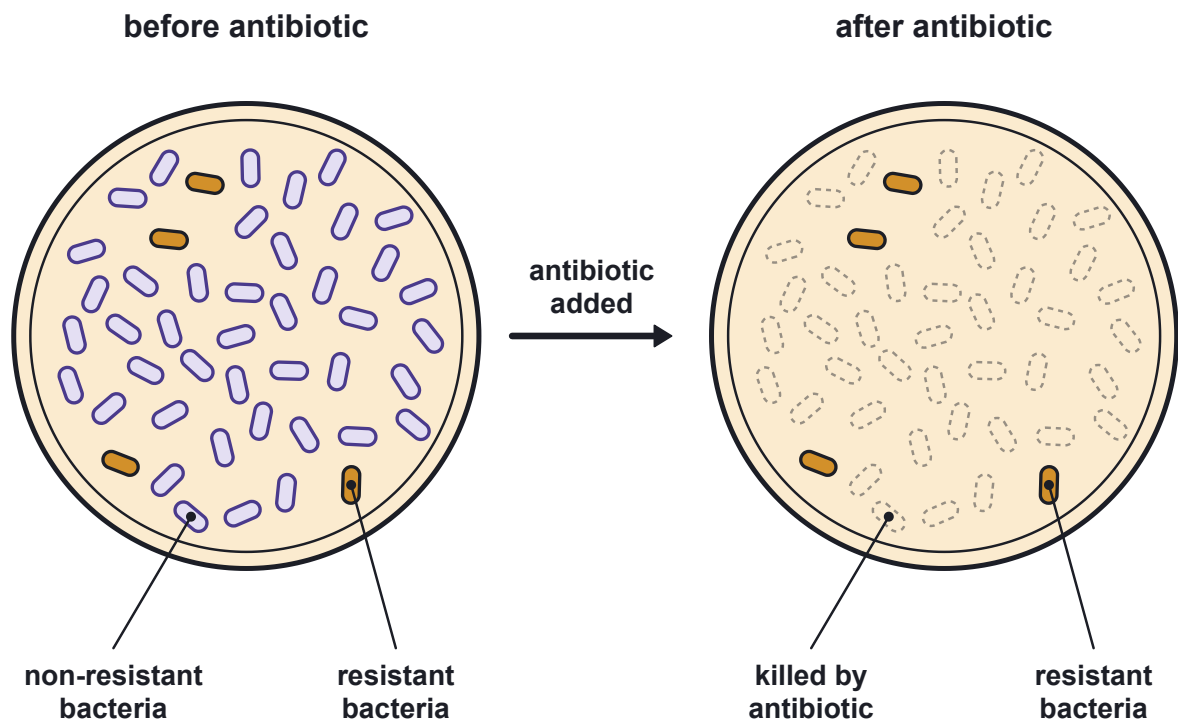
Antibiotics, such as penicillin, are used to treat **bacterial infections**. They **kill bacteria** inside the body, so the infection can be cured. The use of antibiotics has greatly reduced deaths from bacterial diseases. Antibiotics **do not affect viruses**. Viruses live and reproduce inside body cells, and antibiotics do not act on them. An antibiotic will not cure a cold or influenza, which are caused by viruses.

What antibiotics can and cannot treat

	Caused by bacteria	Caused by viruses
Effect of antibiotics	Bacteria are killed	No effect on the virus
Use antibiotics?	Yes, if the infection needs treatment	No

Antibiotic resistance

Some bacteria are **resistant to antibiotics**. The antibiotic does not kill them, so the antibiotic becomes less effective at treating the infection. Infections caused by resistant bacteria are harder to treat.



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An antibiotic kills most bacteria, but **resistant bacteria survive**.

Exam tip: If asked why an antibiotic is not given for a viral illness, say that antibiotics do not affect viruses. Do not say that viruses are 'too small'.

Common mistake: People do not become resistant to antibiotics. The bacteria are resistant.

Limiting antibiotic resistance Spec B13.1.5 Supplement

Bacteria reproduce very quickly, and **mutations** can produce bacteria that are resistant to an antibiotic. MRSA is an example of a bacterium that is resistant to many antibiotics.

1. A mutation produces a bacterium that is resistant to an antibiotic.
2. When the antibiotic is used, non-resistant bacteria are killed but the resistant bacteria are not.
3. The resistant bacteria **survive and reproduce**, passing on the resistance, so there are more of them.
4. The resistant strain spreads, because that antibiotic no longer kills it.

The more often an antibiotic is used, the more chances there are for resistant bacteria to be selected. Using antibiotics **only when essential** limits this.

- Do not use antibiotics for viral infections or minor infections, because they will not help and they give resistant bacteria the chance to survive.
- Fewer uses mean **fewer opportunities** for resistant bacteria to survive and reproduce, so resistant strains such as MRSA stay rare.
- Antibiotics kept for serious cases stay effective for the infections that really need them.

Exam tip: Link the steps in order: mutation, antibiotic kills non-resistant bacteria, resistant bacteria survive and reproduce. Mark schemes reward 'survive and reproduce' and 'pass on the resistance'.

Quick check

1. Define a drug.
2. What type of infection are antibiotics used to treat?
3. Do antibiotics affect viruses?
4. **Supplement** Name a bacterium that is resistant to antibiotics.
5. **Supplement** Why should antibiotics be used only when essential?

Quick check answers

Drugs

1. Any substance taken into the body that modifies or affects chemical reactions in the body.
2. Bacterial infections.
3. No. They kill bacteria but do not affect viruses.
4. MRSA.
5. To give fewer chances for resistant bacteria to survive and reproduce.