

# 10.2 Antibiotics

## Question Paper

Course	CIE A Level Biology (9700) exams from 2022
Section	10. Infectious Diseases
Topic	10.2 Antibiotics
Difficulty	Hard

**Time allowed:** 10

**Score:** /5

**Percentage:** /100

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### Question 1

The data below show the number of deaths due to *Staphylococcus aureus* from 1997 to 2005.

Methicillin is an antibiotic that is used to treat *S. aureus* infections. MRSA is methicillin-resistant *S. aureus*.

Year	total number of death certificates with <i>S. aureus</i>	total number of death certificates with MRSA
1997	369	355
1999	452	431
2001	456	681
2003	420	890
2005	428	1512

Which statement is not supported by this data?

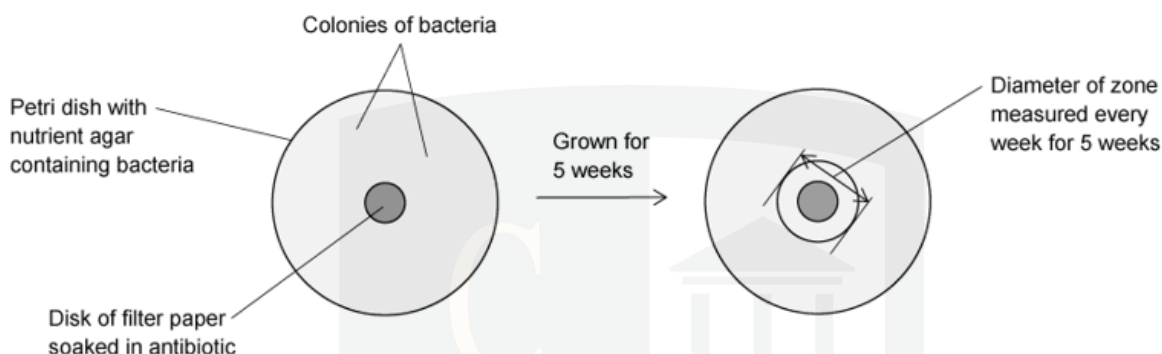
- A *S. aureus* will always cause humans to die.
- B Resistant strains of MRSA are becoming more common.
- C MRSA is more likely to lead to death than *S. aureus*.
- D More people have become infected with MRSA over time.

[1 mark]

## Question 2

The diagram below shows how the effect of growing bacteria in the presence of an antibiotic can be investigated.

Five different types of bacteria were grown on their own petri dish, one example is shown below:



The table below shows the results from testing the antibiotic on the growth of these five types of bacteria. Zones of inhibition less than 13 mm show the presence of resistant bacteria.

type of bacteria	diameter of zone / mm				
	Week 1	Week 2	Week 3	Week 4	Week 5
1	24.10	21.90	19.00	17.60	14.30
2	18.60	15.40	12.20	9.00	0.00
3	17.90	12.80	12.40	11.10	10.90
4	19.40	15.30	13.20	8.10	0.00
5	22.00	21.00	20.50	20.40	20.40

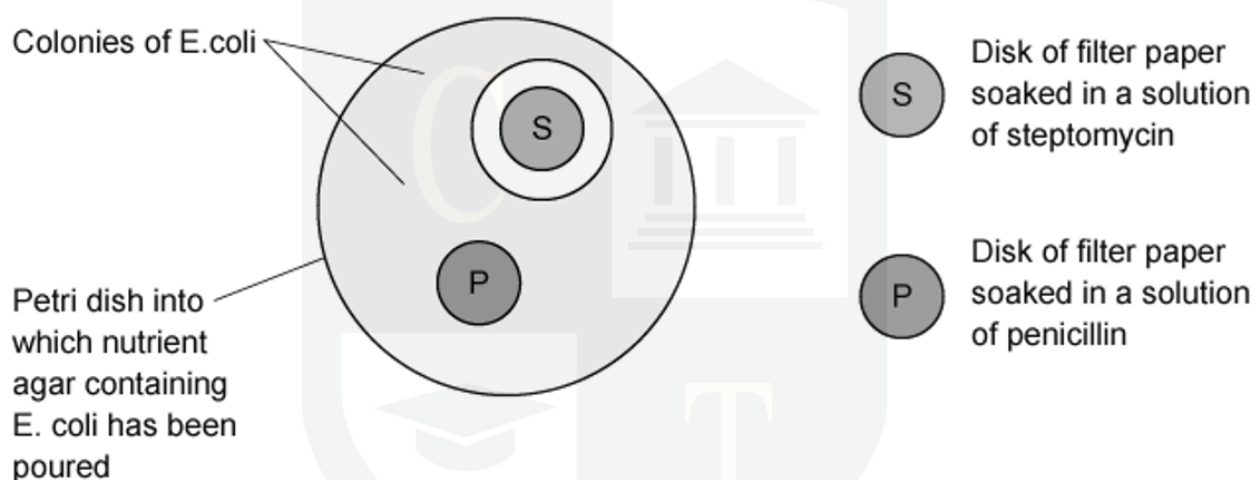
Which statement is supported by the data?

- A** Bacteria type 5 can never become resistant to the antibiotic.
- B** The antibiotic can be used to treat all five types of bacteria.
- C** Only types 2, 3 and 4 of the bacteria showed resistance to the antibiotic.
- D** Bacteria become more resistant over time.

[1 mark]

### Question 3

The diagram shows the effect of growing *Escherichia coli* in the presence of streptomycin and penicillin.



What can be concluded about the results?

	completely resistant	not completely resistant
<b>A</b>	S and P	-
<b>B</b>	P	S
<b>C</b>	S	P
<b>D</b>	-	S and P

[1 mark]

#### Question 4

Some animals have evolved to produce small peptides called cathelicidins. These peptides have a bactericidal effect. They are able to attach to lipids in the bacterial membrane, thereby weakening them.

Synthetic versions of the cathelicidins have been produced. These can be used to treat infections that have become resistant to antibiotics like tetracycline.

Read the following statements:

- 1 The only way a bacterium could develop resistance to it is by altering all the lipids in its membranes.
- 2 Cathelicidins could be used instead of tetracycline, allowing tetracycline resistance to be reduced.
- 3 Cathelicidins are synthetic so bacteria can never become resistant to them.
- 4 Cathelicidins could be used to kill multidrug-resistant strains of bacteria, for which there are no currently effective antibiotics.

Which pair of statements explain how these peptides can help in the fight against antibiotic resistance?

- A** 1 and 3      **B** 1 and 4      **C** 2 and 3      **D** 2 and 4

**[1 mark]**

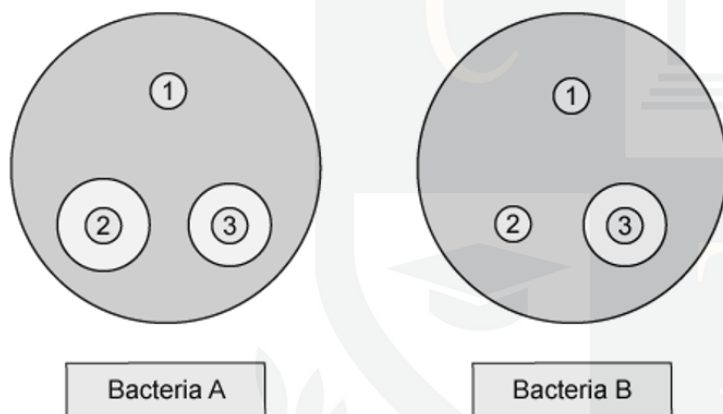
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### Question 5

Two species of bacteria A and B were grown on an agar plate. Each plate had three filter paper discs with the following:

- 1 no antibiotic (control)
- 2 penicillin V, a natural penicillin
- 3 carboxypenicillin, a synthetic penicillin

The diagram below shows the results:



Which statement is a correct conclusion for this experiment?

- A Penicillin V is more effective than carboxypenicillin
- B Penicillin V is equally effective against A and B bacteria
- C Penicillin V and carboxypenicillin are both effective against bacteria A
- D Penicillin V is effective against bacteria B

[1 mark]