1. Why do Gram-negative bacteria stain pink?

   ☐ Their thin peptidoglycan cannot hold the crystal violet–iodine complex after decolourising

   ☐ They are always dead

   ☐ They have no cell wall at all

   ☐ They absorb the counterstain faster

2. What is endotoxin?

   ☐ The bacterial capsule

   ☐ A protein secreted by Gram-positive bacteria

   ☐ The lipopolysaccharide of the Gram-negative outer membrane

   ☐ Diphtheria toxin

3. Which step do neuraminidase inhibitors such as oseltamivir block?

   ☐ Uncoating

   ☐ Release of new particles from the cell

   ☐ Copying of the genome

   ☐ Attachment to the receptor

4. A patient with very low neutrophils after chemotherapy develops a lung infection with branching hyphae. Which fungus is most likely?

   ☐ Candida in the mouth only

   ☐ Pneumocystis

   ☐ Histoplasma yeast

   ☐ Aspergillus

5. A reservoir of infection must be a person who is ill.

   ☐ True ☐ False

6. Why do β-lactam drugs spare human cells?

   ☐ They cannot enter the blood

   ☐ Human cells have no peptidoglycan wall for them to block

   ☐ Human cells pump them out

   ☐ Human ribosomes are protected

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☐ True ☐ False

8. A positive PCR shows that the organism is alive and tells you which antibiotics will work.

   ☐ True ☐ False

9. A bacterium doubles every 20 minutes. Starting from one cell, how many cells are there after 4 hours?

   _____ cells

10. Alcohol hand gel works as well against norovirus as against enveloped viruses.

    ☐ True ☐ False

1. **Their thin peptidoglycan cannot hold the crystal violet–iodine complex after decolourising**

   The decolouriser removes the complex from thin-walled cells, which then take up the counterstain.

2. **The lipopolysaccharide of the Gram-negative outer membrane**

   Endotoxin is part of the wall and is released when Gram-negative bacteria die.

3. **Release of new particles from the cell**

   Neuraminidase cuts new influenza particles free from the cell surface; blocking it traps them.

4. **Aspergillus**

   Neutrophil failure lets moulds such as Aspergillus invade.

5. **False**

   Healthy carriers, animals, food and surfaces can all be reservoirs.

6. **Human cells have no peptidoglycan wall for them to block**

   Penicillin-binding proteins build the bacterial wall; human cells have nothing equivalent.

7. **False**

   Spores survive most disinfectants; only sterilisation reliably kills them.

8. **False**

   PCR detects DNA, which dead organisms also leave behind; drug testing needs a living culture.

9. **4096 cells**

   4 hours = 240 minutes = 12 generations, and $2^{12} = 4096$.

10. **False**

    Norovirus has no envelope for alcohol to destroy, so soap and water are better.

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