



ANSWER BOOK

Pathogens and non-specific defences

Pathogens, disease and immunity · Unit B11

AQA 3.2.4 · OCR A 4.1.1 · Edexcel A Topic 6.5 · CAIE 11.1

6 questions · 21 marks

NAVY EDITION

SECTION A · Short, 1 to 2 marks

- A1** **B1** a bacterial disease named, for example tuberculosis caused by *Mycobacterium tuberculosis*, or cholera caused by *Vibrio cholerae*. **B1** a protoctistan disease named, for example malaria caused by *Plasmodium*. [2]
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SECTION B · Standard, 3 to 5 marks

- B1** **B1** the phagocyte moves towards the bacterium along a concentration gradient of chemicals released by the pathogen or by damaged tissue, which is chemotaxis. **B1** receptors on the phagocyte's cell-surface membrane attach to antigens on the bacterium's surface. **B1** the membrane folds around the bacterium and the edges fuse, enclosing it in a vesicle called a phagosome. **B1** lysosomes move to the phagosome and fuse with it, emptying hydrolytic enzymes inside, and those enzymes hydrolyse the bacterium. **B1** the phagocyte moves some of the bacterium's antigens to its own cell-surface membrane and displays them, becoming an antigen-presenting cell. [5]
- B2** **B1** both act against any pathogen without recognising which one it is, and both act at the same speed on every exposure. **B1** a physical barrier blocks or removes pathogens, whereas a chemical barrier destroys them. **B1** a named physical barrier with how it works, for example skin, which is dry, dead and keratinised, or mucus which traps particles while cilia sweep it to the throat. **B1** a named chemical barrier with how it works, for example stomach acid near pH 2, which denatures the enzymes and other proteins of swallowed bacteria, or lysozyme, which hydrolyses bacterial cell walls. [4]
- B3** **B1** bacteria are still engulfed, because chemotaxis, attachment and the forming of the phagosome are unaffected. **B1** hydrolytic enzymes are not emptied into the phagosome, so the bacteria are not hydrolysed and may survive inside the phagocyte. **B1** fewer antigens become available to be moved to the phagocyte's cell-surface membrane, so antigen presentation is reduced. **B1** the specific response is therefore slow to begin, since clonal selection cannot start until antigen is presented, and the infection is likely to be more severe and to last longer. [4]
- B4** **B1** tuberculosis is caused by a bacterium while influenza is caused by a virus. **B1** antibiotics work by disrupting structures or processes that bacteria have and human cells do not, such as the peptidoglycan cell wall or the 70S ribosomes. **B1** a virus has no cell wall, no ribosomes and no metabolism of its own, so there is nothing for the drug to disrupt. [3]
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B5 **B1** mast cells in the damaged tissue release histamine. **B1** histamine dilates [3]
the arterioles and makes capillary walls more permeable, so more blood arrives and
more tissue fluid leaks out into the tissue. **B1** that tissue fluid carries phagocytes and
antibodies to the site where they are needed, and the increased blood flow makes the
area red and warm.
