



BIOLOGY 2017

Unit 3

Key Topic Test 8 – Responding to antigens

Recommended writing time*: 45 minutes

Total number of marks available: 45 marks

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: C

Explanation:

Prions are composed of proteins.

Question 2

Answer: C

Explanation:

The function of all lymph nodes is to filter lymph as it flows through lymph vessels.

Question 3

Answer: D

Explanation:

Human cells infected by viruses may be killed by cytotoxic T-cells.

Question 4

Answer: D

Explanation:

All lymphocytes develop from bone marrow cells. B cells mature in the bone marrow whereas T cells mature in the thymus.

Question 5

Answer: A

Explanation:

The mucus lining the respiratory tract in mammals is an example of a non-specific defence. This is an example of the first line of defence.

Question 6

Answer: A

Explanation:

Viruses are non-cellular infectious agents and therefore are not classified as organisms. They do illicit an immune response however, explaining the elevated levels of B and T cells.

Question 7

Answer: A

Explanation:

The inflammatory response is a non-specific immune response and involves phagocytic migration to the site of injury.

Question 8

Answer: A

Explanation:

The production of antibodies by plasma cells is an example of a specific immune response.

Question 9

Answer: B

Explanation:

Cytotoxic T-cells are key cells in the body's cellular immune system.

Question 10

Answer: D

Explanation:

Compounds that interfere with pathogen nutrition is an example of a chemical barrier involved in the resistance of plants to pathogens.

SECTION B: Short-answer questions

Question 1

a.

- i.** Prokaryotic

- ii.** Lack of membrane-bound organelles (1 mark)
Single, circular piece of DNA (1 mark)

1 + 2 = 3 marks

b.

- i.** Antigens.

- ii.** All cells have identification molecules (MHC markers) on their surface. Microorganisms are recognized because the identification molecules on their surface are foreign.

1 + 1 = 2 marks

- c.** The humoral immune response begins with the recognition of the serogroup C bacterial antigens by naïve B cells (1 mark). These cells then undergo a process of clonal expansion and differentiation (1 mark). Through this process, the B cell matures into antibody secreting plasma cells, which secrete antibodies (1 mark). Finally, as this response declines, a pool of memory cells remains behind (1 mark). If the body is re-exposed to the antigen, these memory cells will recognize the antigen and respond much more quickly and effectively (1 mark).

5 marks

Total 10 marks

Question 2

- a.** First-line of defence.

1 mark

- b.** A thick cuticle (1 mark) and a secondary cell wall (1 mark) both prevent the initial entry of an invading pathogen.

2 marks

- c.** Defensins interfere with pathogen nutrition (1 mark) and compounds that have antimicrobial activity such as phytoanticipins.

2 marks

- d.** Once the first line of defence has been breached.

1 mark

2017 BIOLOGY KEY TOPIC TEST

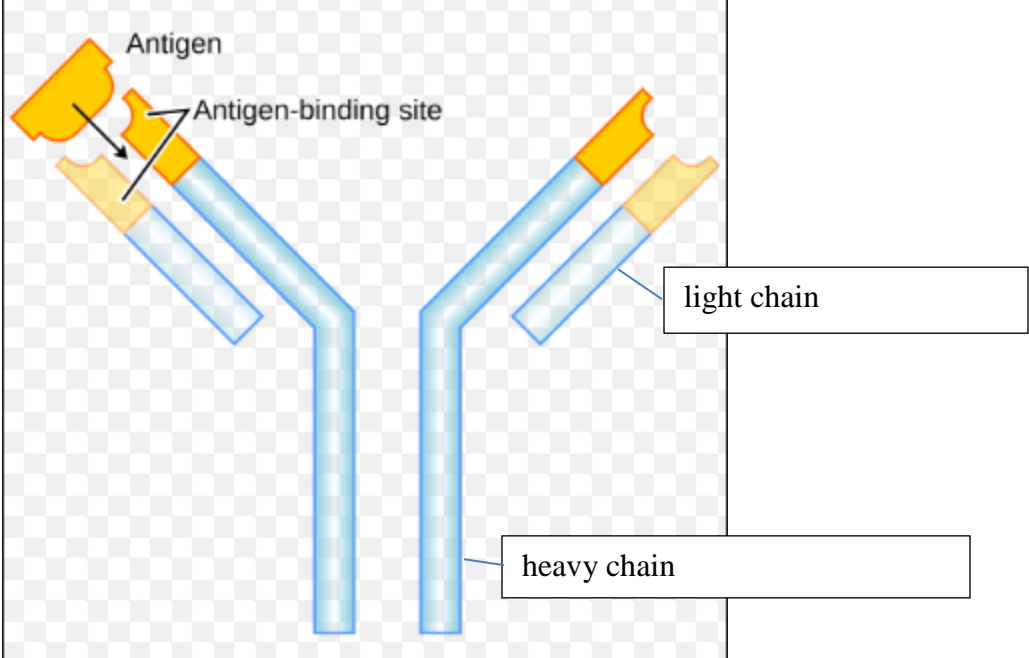
- e. The skin acts a barrier preventing pathogens from invading as well as mucous at the entrance to all cavities to trap invading pathogens and prevent them from entering the organism. 2 marks
- f. Neutrophils and macrophages (or any other correct response). 2 marks
- Total 10 marks

Question 3

- a. Antigens. 1 mark
- b. Second line of defence 1 mark
- c. In the blood 1 mark
- d. Increased blood flow and inflammation. 2 marks
- Total 5 marks

Question 4

- a. They are not specific to a particular pathogen. 1 mark
- b. It stimulates the infected cells and those nearby to produce proteins that prevent the virus from replicating within them. Further production of the virus is thereby inhibited and the infection is stemmed. 1 mark
- c. A multi-directional attack is more efficient then if just the specific immune was response was activated. 1 mark
- d. Antigens. 1 mark
- e. A significant structural change would result in any memory cells formed from prior infection from the former strain no longer being recognised (1 mark) No individuals would have any immunity to the virus and would get sick with severe flu symptoms (1 mark) this would spread quickly and would result in an outbreak (1 mark) 3 marks



f. See above

3 marks
Total 10 marks