

Student Name: _____



BIOLOGY 2020

Unit 3

Key Topic Test 8 – Responding to antigens

Recommended writing time*: 45 minutes

Total number of marks available: 45 marks

QUESTION BOOK

* The recommended writing time is a guide to the time students should take to complete this test. Teachers may wish to alter this time and can do so at their own discretion.

Conditions and restrictions

- Students are permitted to bring into the room for this test: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the room for this test: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this test

Materials supplied

- Question and answer book of 9 pages.

Instructions

- Print your name in the space provided on the top of the front page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the room for this test.

SECTION A – Multiple-choice questions

Instructions for Section A

Select the response that is **correct** for the question. A correct answer scores 1; an incorrect answer scores 0. Marks are not deducted for incorrect answers. If more than 1 answer is completed for any question, no mark will be given.

Question 1

Antigens are unique molecules or parts of molecules found on the surface of all cells and are used by the body's immune system to

- A. identify self and non-self-cells
- B. distinguish between different types of body cells
- C. act as signalling molecules called cytokines
- D. target non-self cells for necrosis

Question 2

Self-antigens are

- A. found on the surface of all pathogens
- B. an allergen that is part of the body
- C. a molecule recognised by a body's first line of defence
- D. a molecule that is attached to a body cell

Question 3

The body responds to an allergen by producing an overactive response to a usually harmless substances causing

- A. sneezing
- B. immunoglobulin A to be released
- C. mast cells to lyse
- D. an inflammation response

Question 4

The difference between cellular and non-cellular pathogens are

- A. cellular pathogens have a membrane bound organelles while non-cellular pathogens do not
- B. cellular pathogens are living while non-cellular pathogens are non-living
- C. cellular pathogens include prions and bacteria
- D. all non-Cellular pathogens are parasites

Question 5

Physical barriers that humans employ to stop entry of pathogens include

- A. ear wax
- B. vasodilation in the skin capillaries
- C. producing toxic chemicals that destroy a pathogens digestive system
- D. lysozymes in tears

Question 6

Chemical defences in plants include

- A. sticky sap released when the epidermis is broken
- B. tannins which interfere with protein absorption
- C. silica which makes chewing difficult
- D. waxy cuticle

Question 7

Complement proteins are a group of large blood borne proteins that are involved in various stages of the immune response. Complement proteins do not

- A. enhance the ability of antibodies and phagocytes to clear pathogens
- B. release antibodies to opsonise pathogens
- C. enhance the inflammation response
- D. lyse a cellular pathogens membrane

Question 8

Dendritic cells are a form of immune cell that is involved in the innate immune response. Innate in this context means

- A. specific
- B. nonspecific
- C. the immune response is adaptable
- D. dendritic cells are always present in all parts of the body

Question 9

The inflammatory response includes multiple steps to stop pathogens. One of these immune responses is

- A. platelets sealing a cut
- B. activation of lymph nodes
- C. release of cytokines to attract monocytes
- D. histamine release from infected cells

Question 10

Mast cells are activated during an allergic response. Attached IgE antibodies are crosslinked by the allergen initiating an increasingly large response. The response that occurs from the crosslinking is

- A. the mast cells lyse releasing histamine
- B. exocytosis occurs releasing proteins
- C. phagocytes are activated to release cytokines for apoptosis
- D. IgE antibodies are released causing further inflammation

Question 11

Lymph nodes are filter systems that decrease the likelihood of pathogens moving into core areas of the body like the chest and the brain. To ensure that pathogens cannot move back out of the lymphatic system to the site of infection the system it

- A. activates the humoral response
- B. has one-way valves
- C. releases cytokines activating Tc cells
- D. produces antibodies

Question 12

Phagocytic dendritic cells and macrophages become antigen presenting cells and move to the lymph nodes. Antigen presenting cells have

- A. antigens attached to MHCII markers to initiate a humoral response
- B. antigens attached to MHCII markers to present to phagocytes
- C. free antigens that are released into the lymph to activate B cells
- D. complement proteins attached which activate the third line of defence

Question 13

Antibodies are proteins that have variable regions that attach to the specific shape of an antigen to enhance the immune response to pathogens. A naïve B cell can produce unique antibodies that are specific to an antigen through a process called

- A. clonal selection
- B. clonal expansion
- C. differentiation
- D. proliferation

Question 14

Humoral immunity refers to the

- A. production of Tc cells
- B. synthesis of antibodies by antigen presenting cells
- C. activation of B cells in response to a specific antigen
- D. differentiation of B cells into Plasma cells and T helper cells

Question 15

T helper cells release cytokines to activate B cells once an antigen presenting cell presents a specific antigen. B cells however do not differentiate until

- A. cytokines are released from the APC
- B. Tc cells activate apoptosis in the infected cell
- C. the B cell encounters the antigen
- D. complement proteins enhance the immune response and activate antibodies

SECTION B – Short-answer questions

Instructions for Section B
Answer **all** questions in the space provided. Write using a blue or black pen.

Question 1

Organisms respond to antigens as a response to a non-self-molecule identifying possible pathogens by the specific shape of the antigen. Pathogens may be cellular or non-cellular however all pathogens have unique antigens that organisms recognise as non-self.

- a.** Contrast the terms self and non-self with reference to antigens

2 marks

- b.** Define antigen

2 marks
Total 4 marks

Question 2

Organisms have a variety of barriers to stop pathogen entry as part of the first line of defence.

- a.** Plants have barriers which include chemical strategies. Give 2 examples of chemical defences that are used in plants

2 marks

- b.** Plants also have physical barriers. List 2 examples of physical barriers in plants

2 marks

- c. Humans coexist with bacteria which form a microbiological barrier to pathogen entry. Give an example of where this occurs in humans and explain how the bacteria create a barrier to entry.

2 marks

Total 6 marks

Question 3

The second line of defence involves the inflammatory response which includes a variety of immune responses to pathogen entry.

- a. What are the 4 stages of the inflammatory response? Explain how each stage assists in removing a pathogen

8 marks

The lymphatic system is an important part of the second line of defence is the pathogen is not destroyed by the inflammation response.

- b. The lymph vessels have valves in them. Explain why

2 marks

- c. The lymph node become swollen when an infection occurs. Explain why

2 marks

- d. The lymph node is the point at which the adaptive immune response is activated. What does adaptive mean in this case?

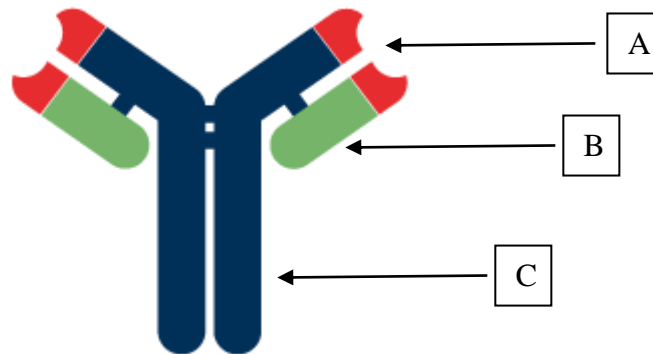
2 marks

Total 14 marks

Question 4

Once B cells are activated in the lymph nodes differentiation occurs and plasma cell and B memory cells are produced. Plasma B cells produce antibodies which play a role in removing pathogens.

- a. Label the antibody structure



3 marks

- b. What is the role of antibodies in removing pathogens?

1 mark

- c. Do antibodies play a role in removing viruses from the body? Explain

2 marks

Total 6 marks

END OF KEY TOPIC TEST