

A level Biology A
H420/03 Unified biology

Question Set 17

- 1 (a) An individual's immune responses can change throughout their lifetime.

Fig. 4.1 shows one person's immune response to the influenza virus when they were first infected and when they were infected two years later by a new, mutated strain of the virus.

The influenza virus has many antigens to which the immune system can respond. Fig. 4.1 shows the response to four of these antigens (A–D).

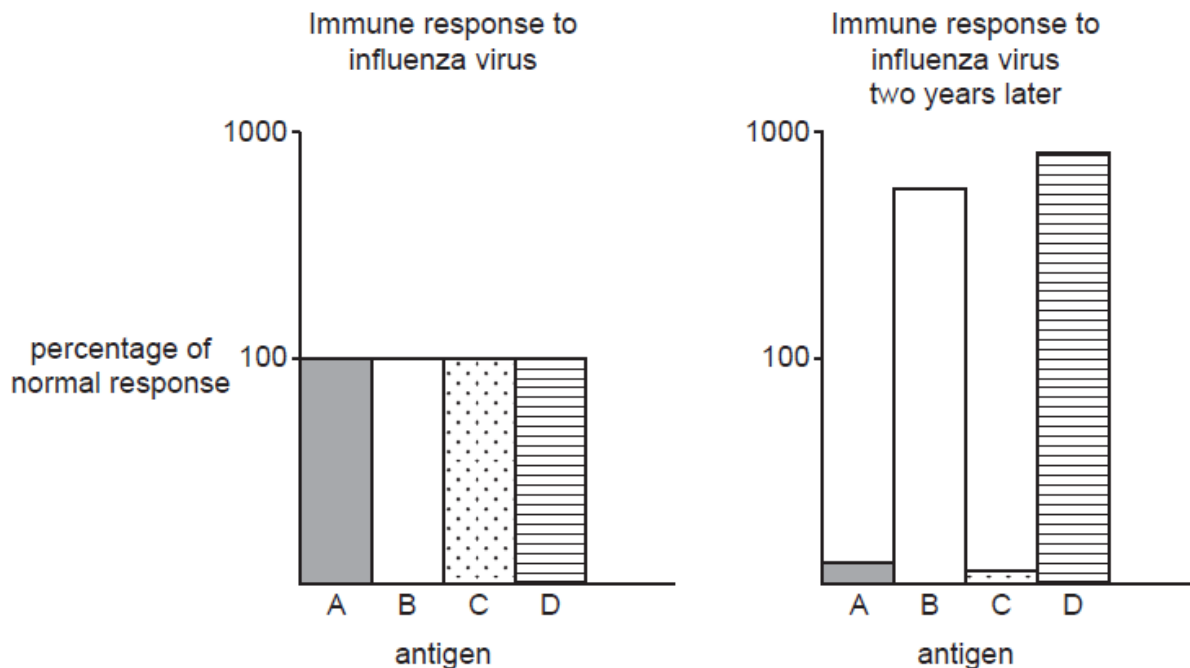


Fig. 4.1

Explain the differences in the person's initial immune response to the influenza virus with their immune response two years later. [2]

- 2 years later, T & B memory cells produce a greater response to antigens B & D
- 2 years later, mutated virus has less antigens A & C

- (b)* The specific immune response involves B and T lymphocytes.

There is variation in specific immune responses between individual animals.

Variation between immune responses can be influenced by genes and the environment.

Using examples, explain how both genes and environment can cause animals to vary in their specific immune responses. [6]

GENES - inherit genes that code for immune cells/antibodies from parents (B/T lymphocytes, macrophages)

- different alleles code for different versions of antibodies
- alleles code for many different variable regions
- mutation produces new alleles for immune cells

ENVIRONMENT - exposure to different pathogens determines immune response (measles, mumps produce memory cells)

- poor diet can weaken immune system (low levels of proteins & vitamins reduce antibodies)
- autoimmune diseases with an environmental component trigger immune response (AIDS)

- (c) It is possible to manufacture antibodies to treat certain diseases. These are known as synthetic antibodies.

DNL-Fab3, shown in Fig. 4.2, is an example of a synthetic antibody.

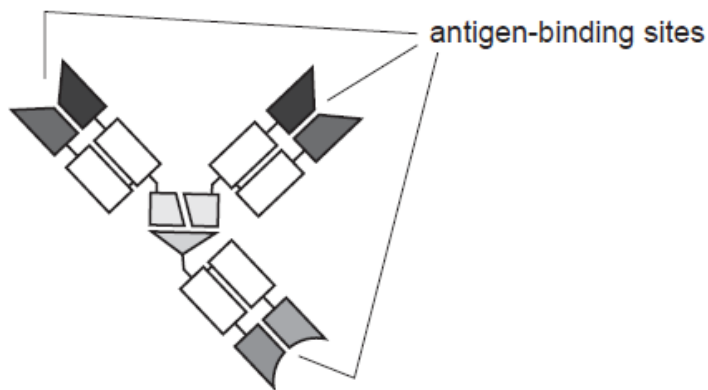


Fig. 4.2

State **two** conclusions that can be drawn from Fig. 4.2 about the differences between the way DNL-Fab3 functions and the functioning of normal antibodies.

- 1 *bind to more than 1 type of antigen*
- 2 *bind to more antigens as have more than 2 binding sites*

[2]

Total Marks for Question Set 17: 10



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