



A-Level Biology

HIV

Question Paper

Time available: 66 minutes

Marks available: 51 marks

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Some people infected with HIV do not develop AIDS. These people are called HIV controllers.

Scientists measured the number of HIV particles (the viral load) and the number of one type of T helper cell (CD4 cells) in the blood of a group of HIV controllers and also in a group of HIV positive patients who had symptoms of AIDS.

The median values and the range of their results are shown in the table.

HIV status of people	Median viral load / virus particles per cm^3 of blood (range)	Median number of CD4 cells per mm^3 of blood (range)
HIV controllers	212 (<50 to 609)	693 (529 to 887)
HIV positive people with AIDS symptoms	66 274 (30 206 to 306 163)	248 (107 to 365)

- (b) A test sample of 500 mm^3 of blood is taken from an HIV controller to determine the viral load.

Tick (✓) **one** box that shows the number of virus particles that would be present in a test sample of blood taken from an HIV controller with the median viral load.

106 000	<input type="checkbox"/>
10 600	<input type="checkbox"/>
1060	<input type="checkbox"/>
106	<input type="checkbox"/>

(1)

(a) Suggest and explain why AZT does not destroy HIV in the body but stops or slows the development of AIDS (lines 3–4).

(4)

(b) Suggest and explain **two** advantages of using HAART (lines 7–9).

Advantage 1 _____

Advantage 2 _____

(4)

(c) Suggest why high doses of AZT lead to muscle wastage (lines 10–11).

(2)
(Total 10 marks)

6.

The figure below shows a test that has been developed to find out if a person has antibodies to the human immunodeficiency virus (HIV) antigen.

Step 1

HIV antigens are attached to a test well in a dish.



Step 2

A sample of blood plasma is added to the well.
If HIV antibodies are present, they bind to the HIV antigen.



Step 3

The well is washed.
A second antibody with an enzyme attached is then added.
This binds specifically to the HIV antibody.



Step 4

The well is washed again.
A yellow solution is added, which changes to blue if the enzyme is present. A blue colour shows that the person has HIV antibodies.

(a) This test only detects the presence of HIV antibodies. Give **two** reasons why it cannot be used to find out if a person has AIDS.

1. _____

2. _____

(2)

(b) The solution will remain yellow if a person is **not** infected with HIV. Explain why.

(2)

(c) A mother who was infected with HIV gave birth to a baby. The baby tested positive using this test. This does not prove the baby is infected with HIV. Explain why.

(2)

(d) A control well is set up every time this test is used. This is treated in exactly the same way as the test wells, except that blood plasma is replaced by a salt solution.

Use information from the figure above to suggest **two** purposes of the control well.

1. _____

2. _____

(2)

(Total 8 marks)