

Exam style question on HIV

Introduction

This question reviews some science explanations and the use of statistical indicators in the context of HIV. It also includes decision making about health care provision.

Suggested answers

a	<ul style="list-style-type: none"> cells are the smallest unit which can reproduce itself/ virus cannot replicate outside cell virus is DNA/RNA (plus protein coat) virus invades cell virus uses cell function to replicate/reproduce many new viral particles in cell cell bursts/dies 	<i>any 3 for 1 mark each</i>	3
b i	<ul style="list-style-type: none"> early acute phase/ AIDS phase – because most viral particles early phase – because ignorant of HIV positive status chronic phase – because longest time <p>do not give mark for phase without reason</p>	<i>any 1 for 2 marks</i>	2
ii	no/very few white cells in AIDS phase	<i>for 1 mark</i>	1
c i	<ul style="list-style-type: none"> Asia highest Asia 7.6% / 76:1000 Africa 6.8% / 68:1000 	<i>any 2 for 1 mark each</i>	2
ii	<ul style="list-style-type: none"> total number in Africa very much higher/ Africa is one third of global total prevalence rate in Africa very much higher more new cases in Africa/ most of global new cases in Africa 	<i>any 2 for 1 mark each</i>	2
iii	<ul style="list-style-type: none"> lack of health workers/ people do not have access to health services lack of drugs lack of diagnostic equipment/ misdiagnosis poor nutrition means less able to resist 	<i>any 2 for 1 mark each</i>	2
d i	<ul style="list-style-type: none"> some viruses in population more resistant these survive initial treatment/ less resistant are killed the more resistant viruses replicate 	<i>for 1 mark each</i>	3
ii	<ul style="list-style-type: none"> distribution network to ensure drugs available health workers diagnostic equipment premises for clinics 	<i>any 2 for 1 mark each</i>	2
iii	<ul style="list-style-type: none"> morally right to care for sick people if at all possible cheaper for health service than caring for very ill person with AIDS better for economy as HIV+ person can work if healthy better for society as HIV+ person can care for family 	<i>any 3 for 1 mark each</i>	3
			20

October 2008

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The white blood cells, and the antibodies which some of them produce, are part of the body's immune system, which fights infection. HIV is a virus which attacks the immune system, reducing its ability to produce white blood cells and antibodies.

- (a) Cells are the basic unit of all living organisms. Use your understanding of cells to explain how a virus reproduces, in words you would use to a non-scientist. Draw a diagram if it helps.

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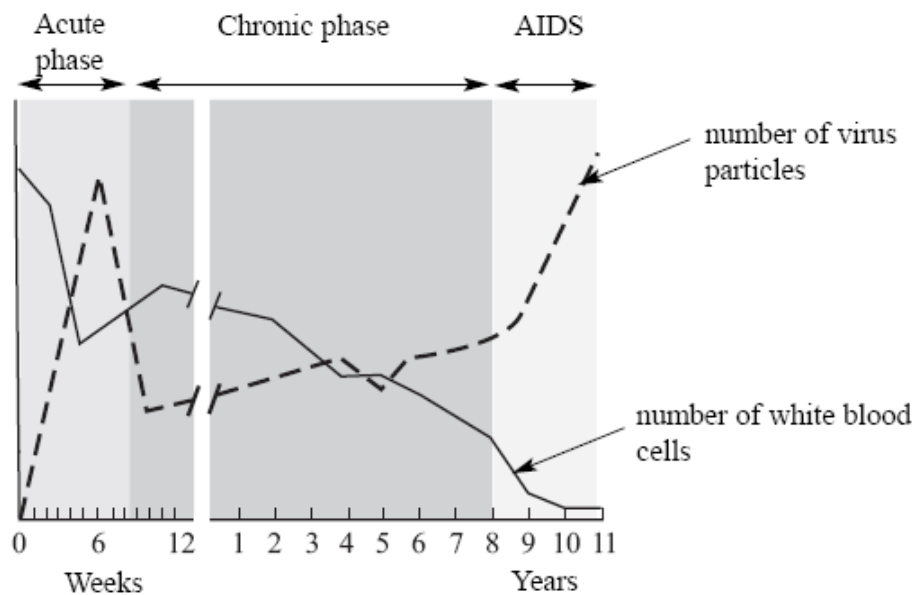
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(3 marks)

Figure 1 Typical progression of HIV infection



(every effort has been made to contact copyright holders of this image)

- (b) Figure 1 shows how the number of HIV particles and white blood cells change over time after infection with HIV.

(i) During which phase(s) of the disease do you think an HIV positive person is most likely to infect others? Explain your answer.

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(2 marks)

(ii) Use Figure 1 to explain why a patient eventually dies from other infections such as pneumonia, not from the HIV itself.

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(1 mark)

Figure 2 Statistics for 3 regions of the world for HIV & AIDS, end of 2007

Region	Adults & children living with HIV/AIDS	Adults & children newly infected	Adult prevalence*	Deaths of adults & children
Sub-Saharan Africa	22.0 million	1.9 million	5.0%	1.5 million
Asia	5 million	380,000	0.3%	380,000
North America, Western & Central Europe	2.0 million	81,000	0.4%	31,000
Global Total	33.0 million	2.7 million	0.8%	2.0 million

*Proportion of adults aged 15-49 who were living with HIV/AIDS

<http://www.avert.org/worldstats.htm>

(c) Figure 2 shows statistics for HIV/AIDS in 3 regions of the world.

(i) According to Figure 2, in which of these regions was the death rate of those living with HIV/AIDS the highest?

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(2 marks)

(ii) Comment on two other significant differences between the regions.

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(2 marks)

(iii) Suggest **two** reasons why the death rate in Africa is much higher than that in North America and Europe.

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(2 marks)

(d) Drug treatments for HIV are available. They are not a cure and have to be taken for life, but they do stop people from becoming ill. Patients have to take more than one drug at any time to prevent the virus becoming resistant to the drugs.

(i) Explain the process by which the viruses in an infected person become resistant .

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(3 marks)

(ii) The cheapest drugs cost about £300 a year per person. Name **two** other costs that are an essential part of any treatment programme.

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(2 marks)

(iii) When the virus develops resistance, as always happens eventually, more expensive drugs are needed. These cost about £2000 a year per person for many years. This is expensive but most health services do provide the drugs if they can possibly afford it.

Suggest **three** reasons why decision makers might consider that it is worth spending this money.

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(3 marks)

Total 20 marks