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General Certificate of Education

Human Biology 1406

HBIO1 The body and its diseases

Report on the Examination

2009 examination - June series

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General

Examiners were concerned that many candidates were leaving answers blank, although there was no evidence that this was a result of lack of time, as there were many blanks on some papers while others were fully answered. There was evidence of lack of understanding of key parts of the specification, as detailed in the report below. Areas that were not well understood by many candidates included the immune system and the processes leading to atheroma formation and a myocardial infarction. The best answered question on the paper was question 9, which relied more on the candidates' ability to analyse and interpret data, rather than on understanding of a biological concept.

Question 1

(a) There were many good responses here. Most candidates could identify these organelles, although a surprising number of candidates left the answer blank.

(b) In (i), many candidates explained the differences in shape by suggesting that the drawing had been done badly, or that the person doing the drawing had not observed the cell section clearly enough. However, a significant minority correctly understood that the section could have cut the organelles in different planes. In (ii), most candidates who recognised the organelles could give an acceptable answer. A few failed to obtain marks due to careless expression; such as suggesting that **X** 'produces energy', or by a simplistic answer such as 'they produce mucus'. A few thought that **Z** (the Golgi body) was involved in protein synthesis.

Question 2

(a) This question was not as well answered here as it has been on previous papers. Many candidates confused antigens with antibodies, and thought that they were produced by the body in response to an infection. While quite a large number of students gained one mark here, only the better candidates scored two.

(b) Better candidates answered this well, but weaker candidates produced confused answers. Again, it was apparent that the immune system is not well understood by weaker candidates.

Question 3

(a) It was unusual for candidates to score full marks here. Many thought that cotinine was a pathogen. The role of T-cells and B-cells was confused by many, and those who did have some understanding of the immune system frequently focused on the production of memory cells, which was not relevant to this question.

(b) Many candidates scored a single mark here, but few gained both marks. The idea of complementary shapes and antigens fitting into receptor/binding sites on the antibody were not well known. A few incorrectly used the term 'active site', while many simply confined their answer to the statement that 'antibodies are specific'.

Question 4

(a) Most candidates failed to read the word 'Explain' here and went on to give a detailed description of the whole curve, with no explanation. A few, somehow, mentioned denaturation at the end of their description and gained a mark. Only a minority of candidates read the question properly and explained the shape of the curve between the points mentioned. There were also many accounts of the effect of kinetic energy on the tertiary structure of the enzyme, despite the fact that the question related to pH and not temperature.

(b) Many candidates scored both marks here, and many gained at least one. The weakest candidates left the answer blank, or offered vague answers such as 'the solutions'.

(c) This was answered poorly by all but the best candidates. Many candidates confused the cell wall and the cell membrane, suggesting that the loss of the cell wall meant that all kinds of toxic substances might be able to enter the cell. When candidates did understand the importance of the cell wall in the structural stability of the cell, it was unusual to see this coupled with osmosis or the idea that the cell wall prevents the cell bursting when water is taken in.

Question 5

(a) Many candidates were able to gain both marks here. There were some good answers relating the effect of slow blood flow in veins in the legs to the formation of a blood clot.

(b) This part of the question was poorly answered. Many candidates did not seem to understand the principles of the circulatory system. The commonest suggestion was that we have two lungs, so blocking some of the capillaries in one lung would not matter as there were other capillaries that were not blocked. Others thought that the clots were too small to cause a myocardial infarction but were trapped by the capillaries in the lungs as these are smaller.

Question 6

(a) In (i), it was rare to award two marks but some gained one mark. Part (ii) was left blank by many. Some candidates only wrote out the equation relating heart rate, stroke volume and cardiac output. Others did manage to work out that one cardiac cycle takes 0.8 seconds but had no idea of what to do with this information. The examiners saw a whole range of answers that candidates should have realised were outside the likely range, such as answers in single figures, decimal places, or in the hundreds. Only about a third of candidates gave the correct answer. Part (iii) was not attempted by many candidates, possibly because they did not read it. The commonest wrong answer was a curve the same as the left ventricle but filling the gap between 0.5 and 0.9 seconds. Only the better candidates scored both marks here.

(b) This was not well known. Many candidates left the answer blank or explained that an artificial heart pacemaker would be needed. It was unusual for candidates to understand that the heart is myogenic and so can beat on its own, without stimulation from a nerve.

Question 7

(a) Many candidates correctly identified this as a hydrolysis reaction, although a minority confused this with condensation.

(b) Many candidates did not appreciate that the amino acids contained fluorine, and thought that the question referred to fluorine instead. Although many candidates scored both marks here, weaker candidates thought that the amino acids with fluorine did not have the correct active site to fit with the protease enzymes, showing poor understanding of the location of the active site.

(c) In (i), there were many vague answers such as 'check everything is clean' 'wear gloves' or 'heat all equipment in a Bunsen flame'. Some candidates did not understand the term 'aseptic technique' and suggested that the plates should be put into an incubator. However, good candidates were able to score well on this question. In (ii), most candidates scored at least one mark. Weaker candidates thought that the AMPs were growing on the plate, so answered that frog AMP does not grow as well as the others. Although many candidates did understand that the fluorine AMPs were more effective than the frog AMP and related this to the size of the inhibition zone, it was rare to see a comment about the different fluorine AMPs varying in effectiveness, or the fact that only one plate had been produced.

Question 8

(a) This was not well answered by most candidates. Many candidates offered suggestions such as 'cell wall' and 'nucleus'.

(b) As with question 4(a), many candidates confined their answers to descriptions of the curve, instead of following the instruction to 'explain'. Some candidates did relate the increase in particles in (i) to replication within T-cells, but it was unusual to find a reference to the virus remaining latent, inactive or dormant in (ii).

(c) Answers here mainly focused on the body's immune system being unable to 'fight' the infection. Weak candidates gave a simple description of the graph. Only the better candidates understood that T-cells were being destroyed as HIV particles were released from them, leaving the body exposed to opportunistic infections as the immune system was functioning less effectively.

Question 9

(a) Many candidates scored well in part (i). Most candidates realised that people with coronary heart disease might have an abnormal heart rate, or that it might be harmful to their health to take a betablocker. In (ii) also, candidates frequently gained the marks by realising that other medicines might interfere with the action of the betablocker, or might change heart rate.

(b) Most candidates were able to score both marks here. Better candidates understood the need to compare the betablocker curve with that for the placebo group.

(c) Better candidates scored three marks here, usually for noticing that there was a small sample size; the age range of the participants was varied; the groups must have been unevenly matched; or that the investigation was not repeated. Weaker candidates simply selected one of these factors, and repeated the point over and over, or gave a pre-prepared list such as 'the experimenters need to consider age, sex and sample size' without relating these factors to these data.

Question 10

(a) In (i), many candidates were able to give a similarity, usually the fact that they both contain fatty acids. However, others suggested they were both fats, or both contained sucrose. In (ii), only the better candidates understood that Olestra would be the wrong shape to be digested by enzymes. It is clear that many candidates do not understand 'digestion', as many of them thought that the Olestra would be absorbed into the body.

(b) Many candidates appreciated the need to avoid bias in (i). However, in (ii) it was rare for candidates to discuss how the members of the group were selected and treated – most focused on only one of these aspects. The commonest suggestion was that the participants should be volunteers. Only better candidates gained all three marks here and understood that the control group should have a similar diet to the Olestra group, but with normal fat instead of Olestra.

(c) Weaker candidates had not understood the information they were given about Olestra, and thought that it was still a saturated fat and would contribute to obesity. There were also concerns about the sucrose it contains, although the fact that the molecule was not digested had not been considered. Better candidates, however, gave a balanced account recognising that Olestra does not encourage healthy eating, and could lead to over-consumption of other undesirable food components, although it may be a way of reducing obesity among people unwilling to change their food preferences.

(d) This question produced many answers of the 'fat clogs up your blood vessels' variety. Candidates rarely focused on arteries, and indeed, many thought it was the capillaries leading to the heart that were affected. There were even accounts of the chambers of the heart gradually filling up with fat. A common misunderstanding was that when you eat too much fat, it first fills up your fatty tissue and then fills up your blood vessels and heart. Another common misunderstanding is that a myocardial infarction takes effect in the lungs and causes difficulty in breathing.