Examiners' Report
Principal Examiner Feedback

October 2024

Pearson Edexcel International Advanced Level in Biology (WBI15)
Paper 01 Respiration, Internal Environment, Coordination and Gene Technology

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The paper was the tenth cycle of the new specification and tested Respiration, Internal Environment, Coordination, and Gene Technology.

The scope of the questions provided a good opportunity for students to demonstrate their knowledge and understanding of these topics.

There was an equal balance between topics 7 and 8.

The questions on this paper yielded a very wide range of responses with some excellent answers given. This resulted in an excellent spread of marks, across the full range (range 14 – 76)

There were some parts of questions that were left blank particularly at the end showing some evidence that students might have had insufficient time to complete the paper. Many students made an attempt at questions on the article which was the final question. However, there were more blank questions for the article possibly indicating the lack of time for detailed analysis and preparation of the article due to time and preparation constraints over the last few years. There is clear evidence that some students are studying the article in detail while others only have a brief experience of it. As it accounts for 22% of the total paper mark time needs to be allocated to study it.

There were some straightforward questions demanding recall that yielded high marks across the cohort and some more demanding questions that discriminated well. Multi choice questions were well answered and proved to be a good source of marks particularly for grade E students. There were many responses which were well articulated showing excellent use of biological technology in context.

However, it is still evident that some students do not pay sufficient attention to the command word used in the question. This is particularly true of 'describe', 'explain' and 'assess' questions. Append 7 in the specifications details the expectations of the command words.

Graphs relating to novel situations continue to be problematic for students. Many students did not refer to the data provided in the graphs and often failed to appreciate the units for axes of the graphs. Responses needing calculations were very varied. However there does seem to be an area that is improving as students become more aware of the nature and demands of this type of question. Clearly this has been a focus of both teaching and practice. Unit conversion and conversion to standard form still present problems to many students. Students need to be careful to follow the instructions in the stem of the question eg. the number of significant figures, or the number of decimal places.

'Suggest' questions offered students the opportunity to show their knowledge and understanding from across the specification.

Questions which demanded analysis, explanation, and application of knowledge to unfamiliar contexts were seen to be more challenging to students and proved to be excellent for discrimination.
A large number of centres are clearly using our mark schemes and examiner reports to prepare students. This is particularly evident where similar mark points have appeared on previous papers. eg. Q3a 'decrease in calcium ions' and 5aii control of heart rate and ventilation rate.. However, care must be taken not to just use the points from previous mark schemes without relating it to the context of the current question.

Question 1(a)

This question provided the students with a diagram of a neurone. Students were asked to show the direction of the nerve impulse using a directional arrow.
As the neurone could be interpreted as either a sensory neurone or a motor neurone and arrow in either direction was accepted.
The majority of students gained one mark here.

Question 1(b)(i),(ii) and (iii)

These multichoice questions were based on a graph showing the changes in membrane potential as an action potential travel along an axon.

The majority of students could correctly indicate (i) the resting potential, (ii) where the neurone in hyperpolarised and (iii) calculate the difference in membrane potential between two points on the graph.

Question 1(c)

This question asked students to give two differences between the functions of a motor neurone and a sensory neurone.

This question was well answered with most students identifying that the sensory neurone took impulses from the receptors to the CNS and the motor neurone took impulses from the CNS to the effectors.
Some students confused structure with function and talked about the positioning of the cell body within the structure of the neurones, but as this isn't a function no marks were awarded.

Question 2(a)(i) and (ii)

These two multichoice questions were based (i) the function of gibberellins and the 'fight or flight' hormone'.
Gibberellins continue to cause students problems. Many still believe that gibberellins hydrolyse starch to release glucose rather than regulate the transcription of genes.
Almost the entire cohort of students correctly identified adrenaline as the 'fight or flight' hormone'.

Question 2(b)

Students were presented with two graphs showing the concentration of testosterone or oestradiol with different concentrations of Tributyltin (TBT).

Question 2(b)(i)

In this question students were asked to describe three conclusions that could be drawn from the investigation.

The majority of students scored 2 marks on this question by identifying the two trends for testosterone and oestradiol with most students giving appropriate data from the graph to back up their statements. Higher level responses compared the concentration of testosterone to the concentration of oestradiol over the course of the investigation. There were very few that made this comparison of the hormone concentrations.

This is an example of an answer which gained three marks.

(3)

As TBT concentration increases, concentration of testosterone decreases.

As TBT concentration increases, concentration of oestradiol increases and then decreases at 100 mg kg^{-1}. concentration of testosterone is higher than that of oestradiol.

Question 2(b)(ii)

Here students were tasked with explaining how steroid hormones regulate gene transcription.

The most commonly awarded marking points were mps two and three. The most common reason why MP4 was not awarded was due to the repetition of language from the question stem, candidates did not refer to the activation or switching off the gene or the preventing of or allowing of transcription. It was pleasing to see that some high level responses referred to steroid hormones being lipid soluble and linking that to the ability to diffuse across the cell membrane. However, a significant number of students thought that the steroid hormone was activating neurones or that the steroid hormone made mRNA.

This is an example of an answer which gained three marks.

steroid hormones are lipid soluble so they can pass through the cell membrane and bind to receptors in the nucleus which causes transcription factors to bind to the DNA strand so that RNA polymerase can bind so that transcription can occur.

Question 3(a)

In this question students needed to explain why a decrease in calcium ions could disrupt the contraction of muscles.

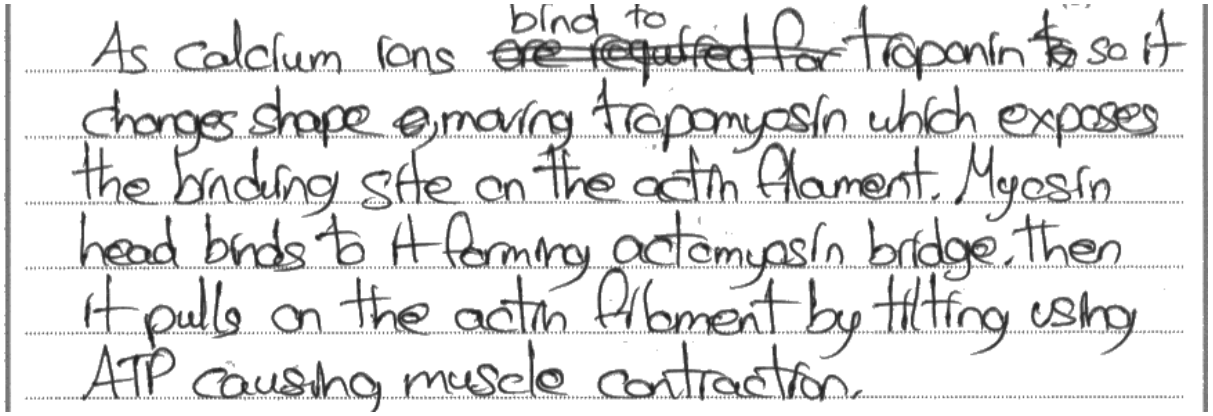
This is the reverse question of a question from a previous exam session. It is clear that many centres have used past mark schemes to aide student performance. However the context is very important if the student is to gain full marks. Here students often explained the role of calcium ions in muscle contraction very accurately. However what they did not do was to answer the question – namely refer to consequence of a decrease in calcium ions.
There were some very good responses.
Care must be taken not to just reuse the phrases from the stem of the question eg. 'disrupt the contraction of muscles' as this would not gain any credit as a marking point.

This is an example of an answer which gained three marks.

(3)

Less Ca^{2+} is released by sarcoplasmic reticulum. So less Ca^{2+} binds to troponin. So less troponin changes shape to shift tropomyosin. Hence fewer myosin binding sites on actin are available for the myosin head to bind to. Therefore less muscle contractions occur.

Here is an example where the student does not explain the effects of a decrease in calcium ions, only referring to the role of calcium ions in muscle contraction.



Question 3(b)(i)

In this question students needed to name the process involved in maintaining calcium ion concentration within the blood.

Nearly all the students were able to successfully answer one of the required responses – namely homeostasis / osmoregulation / negative feedback.

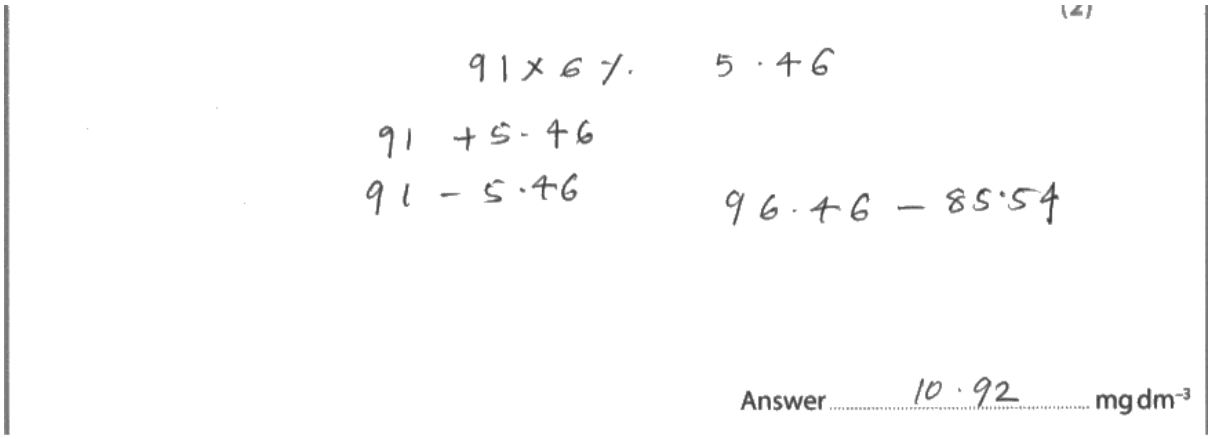
The most common incorrect was response is shown below.

Question 3(b)(ii)

In this question students needed to calculate the maximum possible difference in the calcium ion concentration in the blood.

Surprisingly many students found the calculation a challenge either only calculating the upper or lower limit of the calcium ion concentration in the blood. Furthermore there were several instances of blank responses with no attempt at the calculation.

Here is response with all the calculations showing that gained full marks.

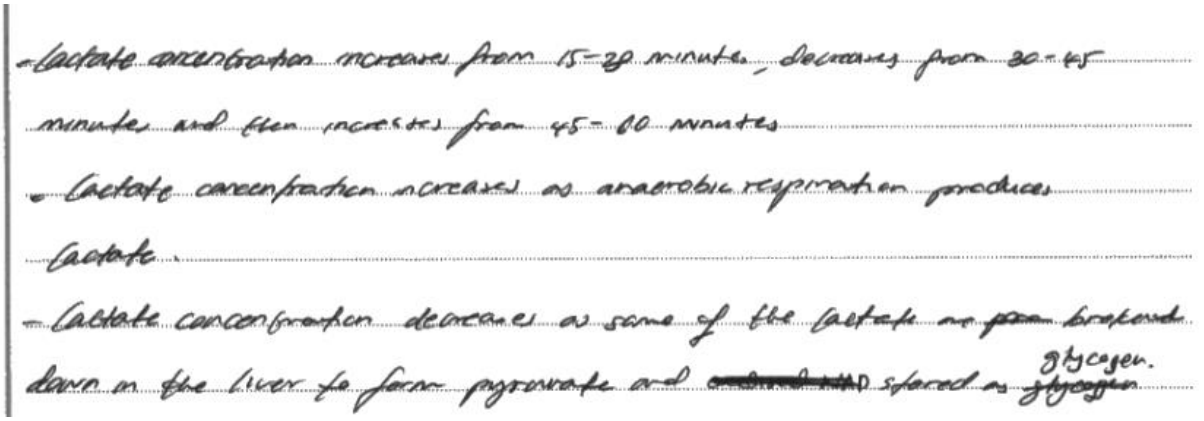


Question 3(c)(i)

In this question students had to explain the effect of lactate concentration from 15 – 60 minutes using the graph.

It is important that students read the question carefully as a significant number tried to explain the lactate concentration between 0 and 60 minutes. However the majority of students achieved full marks here getting mps 1 and 2. Mp3 was rarely seen with comments about 'lactate produced is being converted into pyruvate'.

This is an example that obtained all three marking points. (for a maximum 2 marks)



Question 3(c)(ii)

In this question students needed to state one reason why the lactate concentration was measured 15 minutes before starting exercise.

Nearly all students obtained a mark for their response.

Question 3(c)(iii)

In this question students needed to state one variable that would need to be controlled in the investigation **and** how this would be achieved.
Students usually named an appropriate variate but then failed to state how this would be achieved. Both aspects were required for the mark. Unfortunately many students still think that same is equivalent to similar. Eg a 'similar temperature' is not the same as the 'same temperature'.

Question 4(a)

Students were given a graph which showed the effect of age on the number of dopamine producing cells in people who develop Parkinson's disease.
Students were asked to explain why the symptoms of Parkinson's disease increase with age. They were also told to use the graph to support their answer.

However fewer candidates than expected followed this instruction. Nearly all students gained mp1, the ones that didn't gave very vague descriptions that did not use the axes labels. Centres are encouraged to remind students of the importance of using the given variables in their responses. Very few students identified the age where the number of dopamine producing cells fell below 350,000. Most students could relate the reduction of number of DRC to the reduction in dopamine production to gain mp3. Surprisingly fewer students extended their response to explain that the reduction in dopamine would result in fewer nerve impulses. Higher level responses successfully linked fewer nerve responses to the reduction in muscle contraction to gain mp5.
Lots of candidates missed mark point 5 as they just said, this increased the symptoms of Parkinson's rather than explaining what the impact of fewer action potentials was.

These are examples of responses that achieved all marking points thus full 4 marks.

Parkinson's disease is caused by the death of dopamine producing cells in the part of the brain called substantia nigra. As a person ages, the number of dopamine producing cells of a person with parkinsons disease decrease. At 20 years, the number is 420,000, but at 70 years this number falls by 320,000 to a value of 100,000 cells. So the very less dopamine is synthesised as the person ages. As a result, fewer dopamine is released from pre-synaptic neurones at synapses for neurones responsible for motor function. So less dopamine neurotransmitters bind with receptors on the post-synaptic membrane causing fewer Na+ channels to open. So as less Na+ ions diffuse into post-synaptic neurone, depolarization is less. So threshold potential is not reached sometimes and action potential is not fired so muscles cannot contract.

(4)

As age increases from 0-80, number of dopamine producing cells decrease, with a sharper decrease after age 40. After 44 years old, the number of dopamine producing cells decrease below 350000 and has a 62% decrease from age 40-60. Therefore, with dopamine producing cells below 350000, age 44 or above are more likely to develop Parkinson's as less dopamine produced and released by exocytosis into synaptic cleft, less dopamine binding to postsynaptic receptors, less ~~depolarisation factor~~ ligand gated sodium ion channels open in postsynaptic neuron, less depolarisation factor potential in postsynaptic motor neurons to muscles hence less muscle contraction.

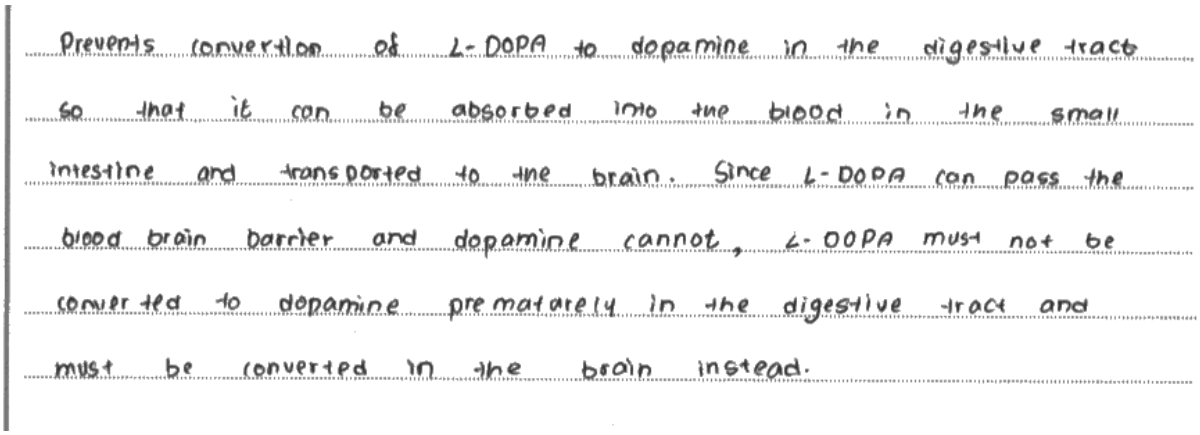
Question 4(b)

In this question students were told that the drug carbidopa is an inhibitor of the enzyme found in the digestive system. Students were asked to suggest why carbidopa is given to patients when they are treated using L dopa in tablet form. Most responses gained 1 mark for either mp1 or mp2. mp3 was not seen. The most common misconception was

that the enzyme was given to control the concentration of L-DOPA given and prevent excess of dopamine. 2 together for the comment in yellow highlighting in the additional guidance.

Many students seemed not to have understood the word 'inhibitor' or recognise the significance of this word in the question.

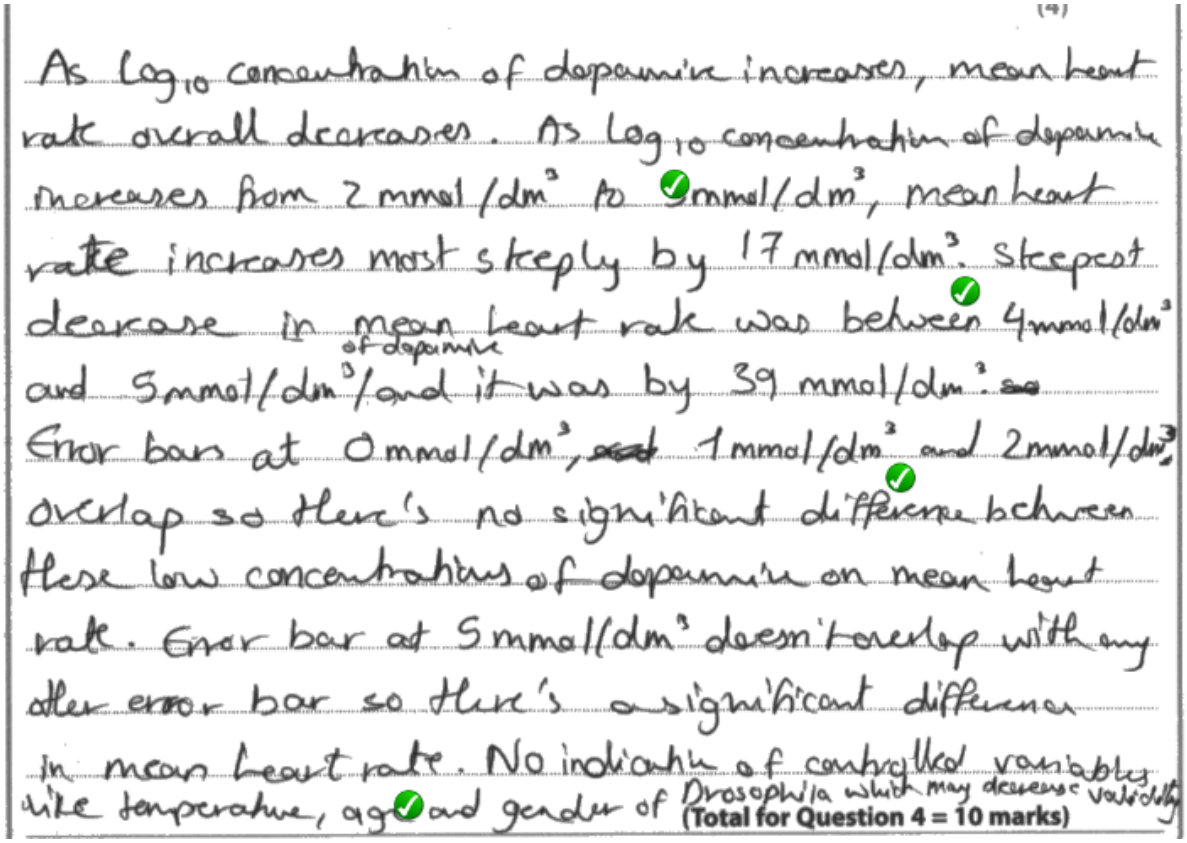
This is an example of a response that obtained 2 marks.


Prevents convertion of L-DOPA to dopamine in the digestive tract so that it can be absorbed into the blood in the small intestine and transported to the brain. Since L-DOPA can pass the blood brain barrier and dopamine cannot, L-DOPA must not be converted to dopamine prematurely in the digestive tract and must be converted in the brain instead.

Question 4(c)

In this question students were provided with a graph showing the mean heart rates of groups of 10 Drosophila recorded at different concentrations of dopamine. The X axis had a log scale which added complexity to the analysis. Students were expected to analyse the given data and comment on the results of this investigation. Most students could describe the effect of the increasing concentration of dopamine on the mean heart rate. It was pleasing to see a significant number of responses using the given data in their answer and therefore gaining mp2 in conjunction with mp1. These were the most commonly awarded mps. A small number of responses ignored the fifth data point and just described the positive correlation between concentration of dopamine and the mean heart rate. Centres are encouraged to remind students to be specific when referring to error bars in their responses. Frequent vague references to overlapping error bars or non overlapping error bars were seen which did not state which concentrations they were referring to. These were given no credit. Some relevant comment on methodology was seen in high level responses, mainly centering around only 10 Drosophila being used. The usual confusion over reliability repeatability and validity was seen.

This is an example of a response that gained full marks.


As Log_{10} concentration of dopamine increases, mean heart rate overall decreases. As Log_{10} concentration of dopamine increases from 2 mmol/dm^3 to 3 mmol/dm^3, mean heart rate increases most steeply by 17 mmol/dm^3. Steepest decrease in mean heart rate of dopamine was between 4 mmol/dm^3 and 5 mmol/dm^3 and it was by 39 mmol/dm^3. Error bars at 0 mmol/dm^3, 1 mmol/dm^3 and 2 mmol/dm^3 overlap so there's no significant difference between these low concentrations of dopamine on mean heart rate. Error bar at 5 mmol/dm^3 doesn't overlap with any other error bar so there's a significant difference in mean heart rate. No indication of controlled variables like temperature, age and gender of Drosophila which may decrease validity

(Total for Question 4 = 10 marks)

Question 5(a)(i)

In this multichoice question students had to identify which feature enabled the pronghorn to run long distances.

The majority of students were able to identify that 'increased number of slow twitch muscles' was the adaption.

Question 5(a)(ii)

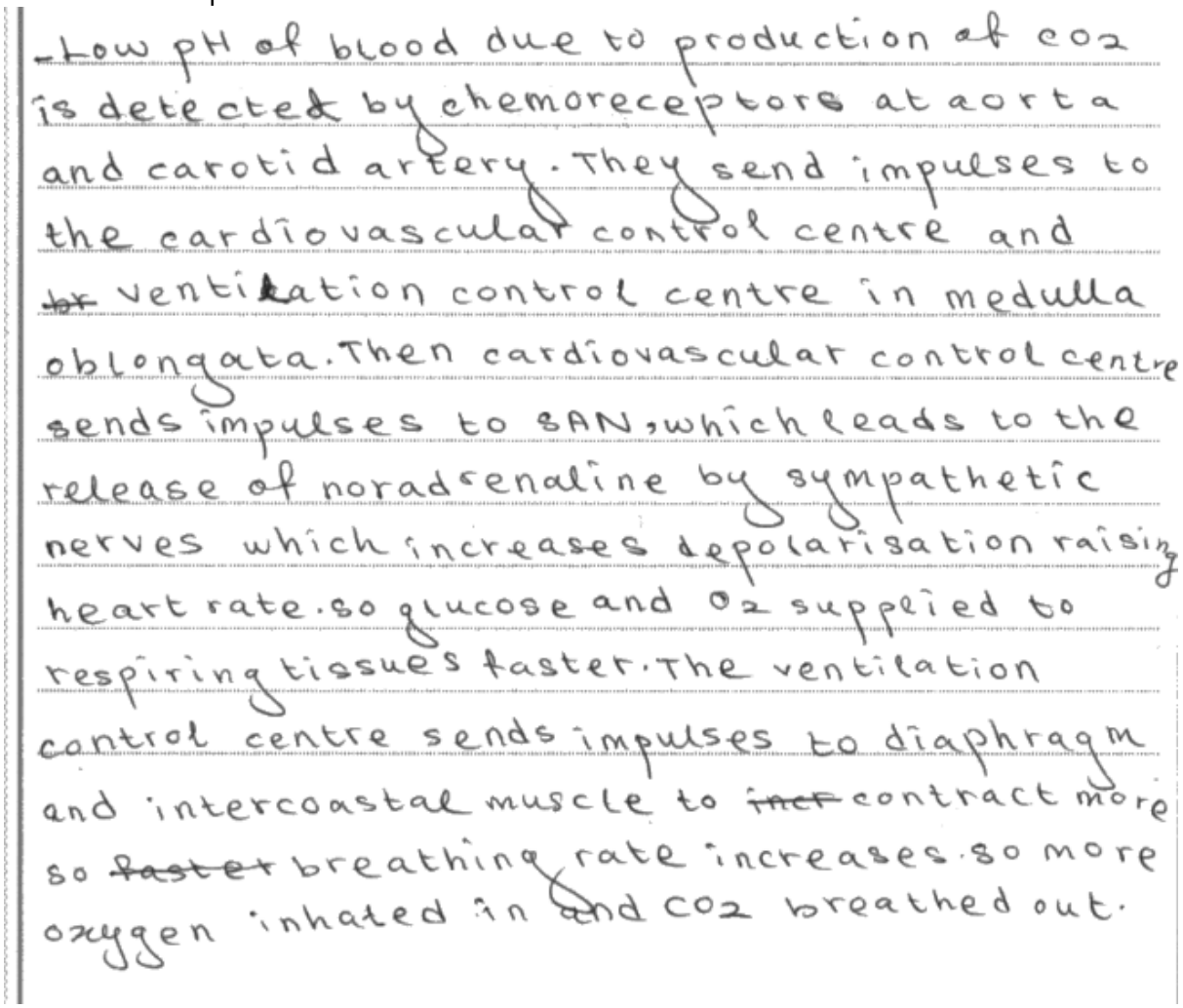
In this question students had to explain how the heart rate and ventilation rate of a pronghorn are increased to enable it to run for long distances.

There have been similar questions in recent exam sessions and exam reports have highlighted that the terms 'signals', 'messages', and information' are not suitable alternatives to impulse.

It was pleasing to see that many students achieved full marks here. Mps 1,2 and 3 were often achieved in the first few sentences. Mps 4,5 and 6 were targeted at the higher grades and needed greater specificity in student responses. Mp4 and 6 required the word 'more', and mp5 required 'heart' or cardiac.

It is important that students give answers that are specific and use the correct biological terms.

This is an example that achieved full marks.


- Low pH of blood due to production of CO_2 is detected by chemoreceptors at aorta and carotid artery. They send impulses to the cardiovascular control centre and ~~br~~ ventilation control centre in medulla oblongata. Then cardiovascular control centre sends impulses to SAN, which leads to the release of noradrenaline by sympathetic nerves which increases depolarisation raising heart rate. So glucose and O_2 supplied to respiring tissues faster. The ventilation control centre sends impulses to diaphragm and intercoastal muscle to ~~incr~~ contract more so ~~faster~~ breathing rate increases. So more oxygen inhaled in and CO_2 breathed out.

Question 5(b)(i)

In this question students were given a table comparing the mass, resting metabolic rate and pulse rate of a range of mammals.

Students were asked to describe the relationships between these. It is important that students take careful note of the command word used. Here the command word was 'describe'. In the specification on p69 there are clear definitions of these command words. To describe needs an account of something, without needing to include a justification or reason.

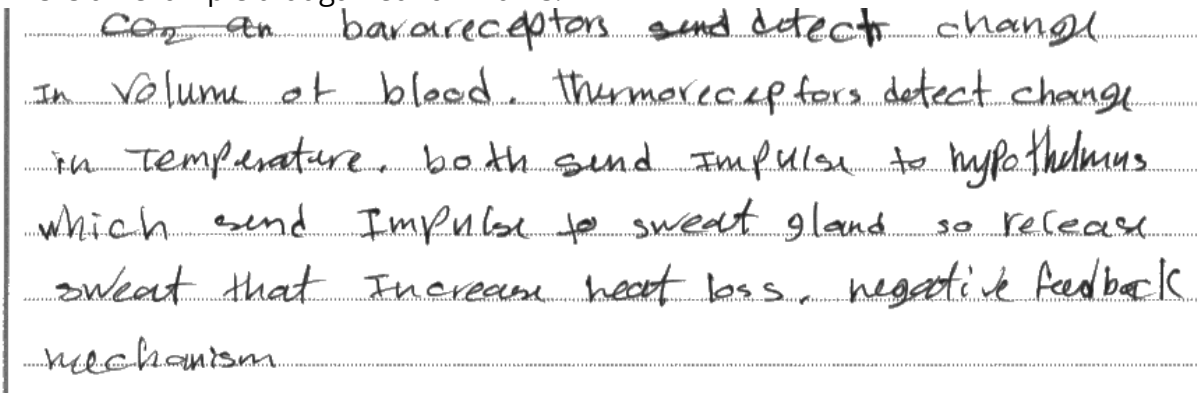
Most students obtained mps 1 and 2, often in the same sentence. Mp3 was frequently missed as students spent time explaining the relationships stated for mps1 and 2.

Question 5(b)(ii)

In this question students had to describe how the body temperature of a human is maintained at 37˚during exercise.

This question was well done with the majority of students getting either 2 or 3 marks. Students correctly identified thermoreceptors (mp1) and impulses going to the thermoregulatory centre (mp2) often in the same sentence. Students also correctly identified impulses from thermoregulatory centre via motor neurones / sympathetic neurones to a named effector, with a correctly named outcome eg. more sweat production / vasodilation.

This is an example that gained full marks.



Question 6(a)(i)

This was a mathematical question where students needed to calculate the magnification of an image of the Bowman's capsule and give the answer in standard form.

Many students got the expected answer and gained full marks. Some did the calculation where the steps taken were clear in the workspace while others just gave the magnification. It is recommended that in calculations it is better to show the workings as well as an answer. If the answer is incorrect, students may gain some credit for correct working.

A few students either did not give their final answer in standard form or included units eg. nm rather than the permitted x. These were not creditworthy.

Question 6(a)(ii)

This was a mathematical question where students needed to calculate the volume of the Bowman's capsule and give their answer to two significant figures.

Generally this was well done and most got the expected answer and gave it to two significant figures.

Question 6(b)(i)

In this question students had to identify the specialised receptor that detects changes in plasma solute concentration.

Most got the expected answer – osmoreceptor, although a few did name chemoreceptor as the receptor.

Question 6(b)(ii)

In this question students needed to state one reason why the plasm solute concentration of the blood needed to be kept within a narrow range.

This is a very opened ended question and provided the response was biologically correct credit was given.

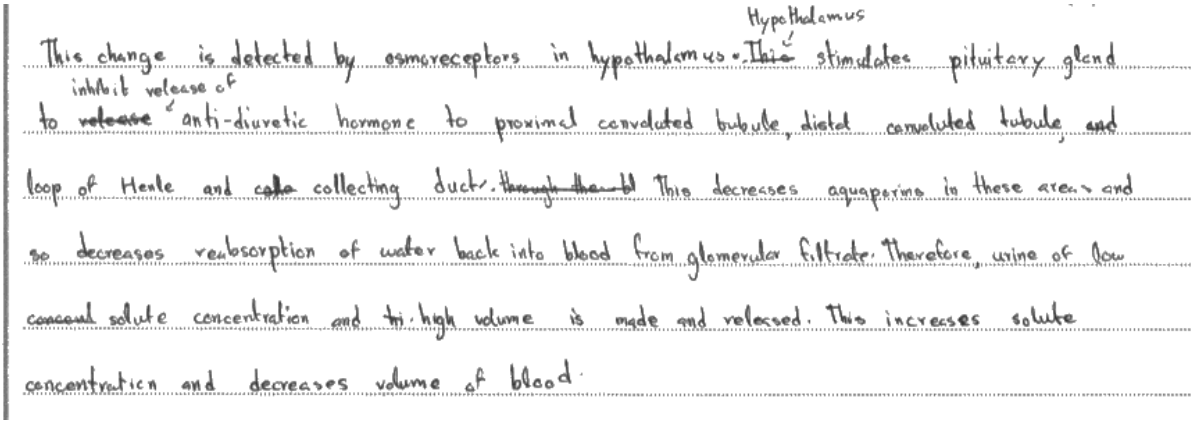
Question 6(c)

In this question students had to explain how the body responds to drinking too much water causing the plasma solute concentration to decrease and the blood volume to increase.

Most students identified that the change was detected by osmoreceptors (mp1) and that resulted in the pituitary gland released less ADH (mp3). However a significant number of students failed to mention the pituitary gland. The result of less ADH causing a decrease in permeability of the DCT / collecting duct (mp4) leading to less water being reabsorbed by the kidney(mp5).
Only a few students named the baroreceptors as being the receptor detecting blood pressure together with where these receptors were to be found. This was targeted at a higher grade.

It is important that students do not couch their answers in vague biological terms eg saying tubules rather than collecting duct / distal convoluted tubule.

This is an example of a response getting full marks.



Question 6(d)(i)

In this question students needed to identify which method reabsorbs glucose from the proximal convoluted tubule into the blood.

Most students got the expected answer although 'osmosis' was seen several times.

Question 6(d)(ii)

This was a mathematical question where students needed to calculate the rate of glucose filtration and give their answer in milligrams per second.

As has been identified in recent exam session students find converting between units challenging. Clearly it is an area that requires frequent practice.

Here a significant minority of students converted grams to milligrams by dividing by 1000 rather than multiplying by 1000.

Question 7(a)

In this multichoice question students had to correctly identify the description of a GM organism.

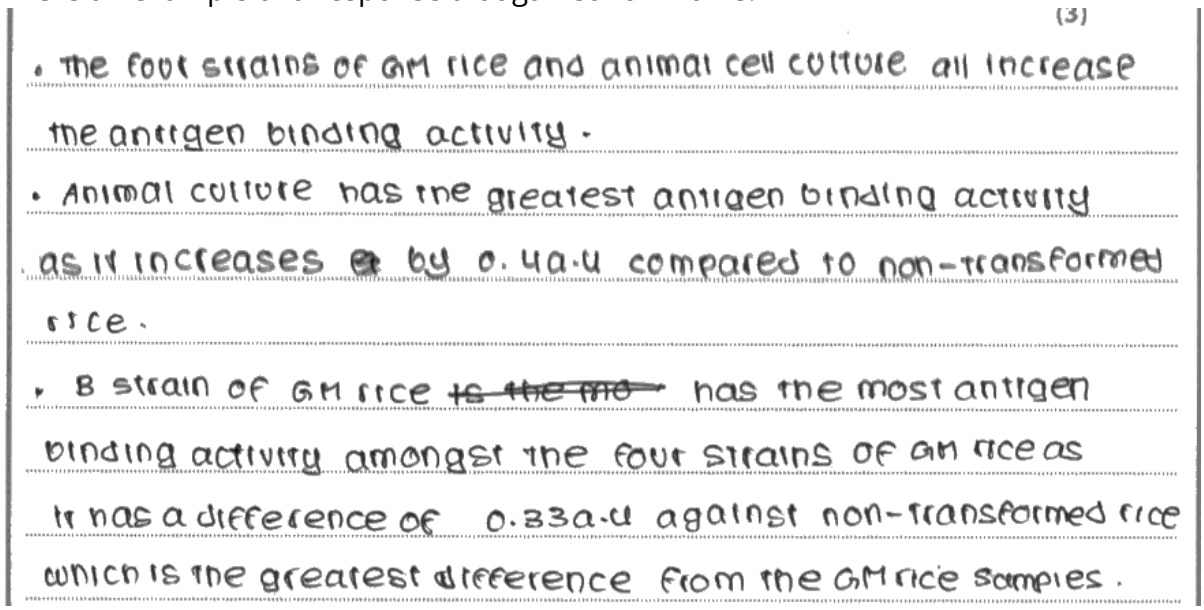
Most students correctly named 'an organism containing genetic material from another species'.

Question 7(b)(i)

In this question students were given a graph comparing the antigen binding activity of a BVZ antibody produced using a control non-transformed rice, animal cell culture, and 4 strains of GM rice. Students were asked to describe 3 conclusions that could be made from these results.

This was particularly well answered with the majority of candidates gaining marking point 2,3 and 4. Most students could recognise that the animal culture had the highest antigen binding activity, however some students did not use the variables as shown on the axes labels in their answer. However many students could identify that the non-transformed rice had the lowest antigen binding activity or another aspect of mp2. A significant number of students gained mp3. However some students did not make it clear that they were comparing the four strains of GM rice. Statements such as strain B had the highest binding activity unqualified were not creditworthy. Surprisingly few students made the statement that all have antigen binding activity to gain MP one.

This is an example of a response that gained full marks.


(3)

• The four strains of GM rice and animal cell culture all increase the antigen binding activity.

• Animal culture has the greatest antigen binding activity as it increases by 0.4a.u compared to non-transformed rice.

• B strain of GM rice ~~is the the~~ has the most antigen binding activity amongst the four strains of GM rice as it has a difference of 0.33a.u against non-transformed rice which is the greatest difference from the GM rice samples.

Question 7(b)(ii)

In this question students had to explain how BVZ antibodies can cause the destruction of cancer cells.

Most students could describe the binding of the antibody to antigens on the cancer cells membranes for mp2. It was pleasing to see that quite a few students used the word opsonisation in their answers. Some students however just referred to antibodies binding to the cancer cells without referring to antigens, this was too vague to gain the mark. Most students could then extend their answer to explain how this could cause the destruction of the cancer cell. Frequent links to enhanced phagocytosis due to the opsonisation were seen. Some responses also described the destruction of the cells by killer T cells.

This is an example of a response getting full marks.

the BVZ antibodies are complementary to the shape of antigens, so they would bind to it. this allows the antibody to agglutinate multiple cancer cells so that macrophages can destroy the cancer cells.

Question 7(c)

This was the level based question where students had to assess the risks and benefits of genetically modifying the fungus for future food production in a globally warming world.

Students were provided with a table comparing normal fungus and GM fungus with their height, number of cobs and concentration of toxin. The second table compared the percentage of maize infected with the fungus as the temperature rose 2˚and 5˚C.

If students simply describe one aspect from the first table then it is level 1 one mark.

If they also give a statement from the second table eg. as the temperature increases the percentage of infection increases – then it is level 1 two marks.

3 & 4 are for the benefits of GM fungus

5 & 6 are for the risks of GM fungus

There are a maximum of TWO marks each for the benefits and risks section.

It was pleasing to see that most candidates are getting used to the idea of using the tables in their responses. There were very few blank responses. The biggest issue was that several of the responses were 'couched' vaguely. Students need to be more specific both in respect of their answer and in their use of biological terms. Several full marks were seen. However students found it easier to assess the risks rather than the benefits.

Many students gave vague responses about significant differences, between the data provided. This did not gain credit as it did not answer the question.

This is an example of a response gaining full marks.

BENEFITS

- Due to the use of the GM fungus the plant height increases by 35% and the number of grains per cob increases by 4
- This shows that there is an increase in yield of the crop by using GM fungus. The added grains per cob could increase the nutritional value of cob and can allow farmers to increase the price and gain more economical benefits. It also decreases the conc. of toxin by 260 a.u. so plant growth would increase and animals won't die due to it's poisonous nature so it prevents disruption of the food chain. This will also decrease the cost of removing such toxins and can possibly allow pest & weed resistance. It can also supply food in the events that the global temperature increases as the percentage of crop infected with the fungus would inc

RISKS

- ~~Due to~~ The maize crop infected by GM fungus require higher temperature for growth as the optimum temperature of it is higher. This will cause other organisms to not ~~be~~ survive. It can also result in loss of biodiversity. The GM fungus could infect other crops which may not be able to grow due to it and the long term effects of eating GM crops on human health is unknown. The crops infected with GM fungus can also potentially cross breed, and if the fungus would potentially infect the people eating the crop as well.

(Total for Question 7 = 12 marks)

Question 8(a)

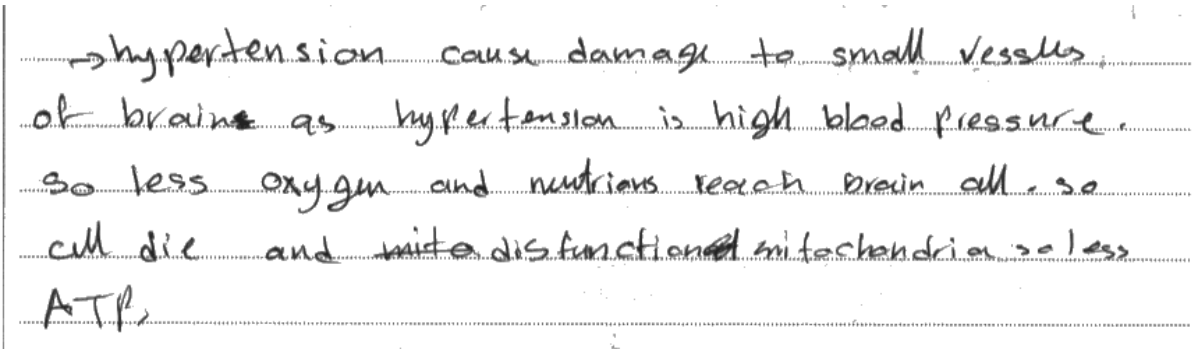
In this question students had to describe the role of hypertension in causing dementia.

This question was quite well answered as students correctly linked damage to blood vessels to a reduction in oxygenated blood to brain cells. Many students described all three marking points for a maximum 2 marks.

Often students directly quoted from the article which was creditworthy providing they

put their response in the context of blood vessels. Eg, microstructural damage to blood vessel.

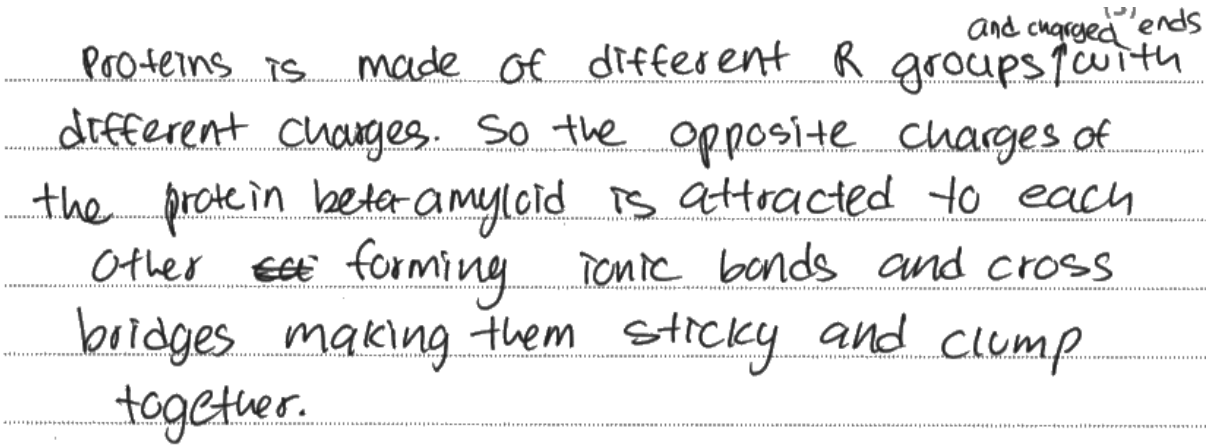
This is an example of a response that gained full marks.



Question 8(b)

In this question had to suggest why the beta-amyloid is chemically sticky gradually clumping together. Students were asked to use their knowledge of protein structure to support their answer.
Unfortunately by asking students to use their knowledge of protein structure to support their answers seemed to divert their answers towards the structure of proteins. Many responses had detailed the primary, secondary, tertiary and quaternary structures of protein without answering the question in context.
Mp1 was not seen. Several responses referred to hydrophobic / hydrophilic tails which did not gain mp2. Reference to R groups of proteins was required for mp2. For mp3 an explanation about bonds being formed between protein molecules, not bonds within a protein molecule.

This response gained two marks.

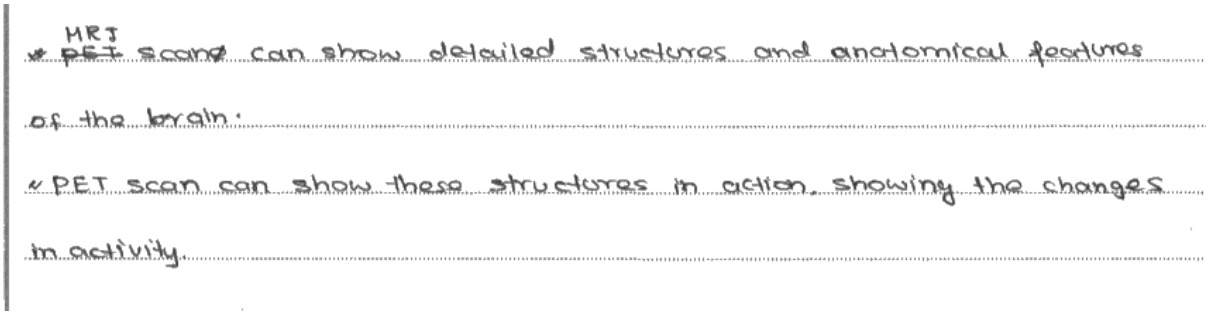


Question 8(c)

In this question students had to describe the information that would be obtained from using a combined MRI and PET scan of the brain.

This question was well answered with many students gaining full marks. Both techniques have appeared in recent exam papers and clearly centres have taken on board the advice given in previous examiner reports. Mp2 was frequently given in the context of identifying brain activity and mp1 giving {2D / 3D / computer} image. These two mps were most commonly seen. MP3 was often missed as there was no reference to 'detailed' structural or anatomical information.

This response gained full marks.



Question 8(d)

In this question students had to give one reason why it might be considered unethical to tell people they are at risk of developing cognitive impairment.

This is a very open ended question and the full gamut of responses were seen and accepted. It is impossible to put all the responses in the mark scheme.

The majority of students came up with a reasonable and realistic suggestion which was accepted.

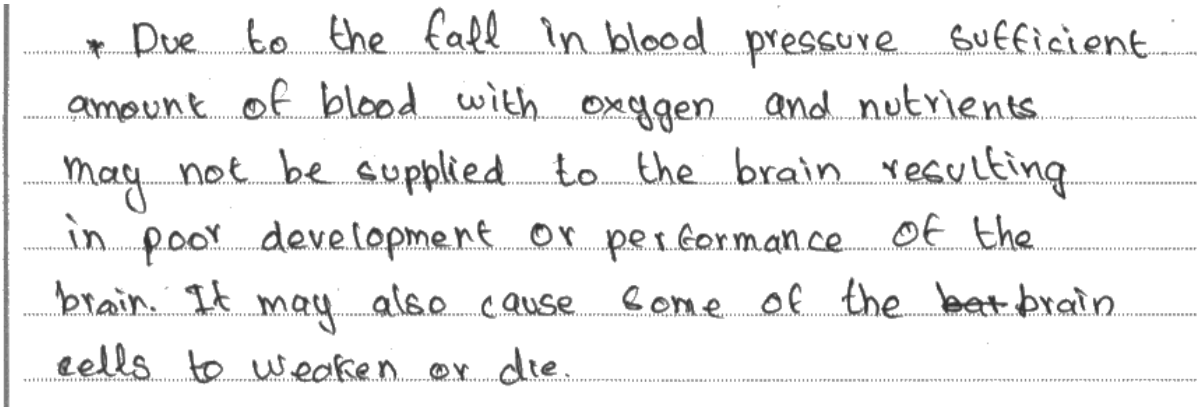
Question 8(e)

In this question students had to explain why a falling blood pressure might result in poor brain health.

Many students achieved full marks here. Mps 1 and 2 were often seen in one sentence. Fewer students obtained mp3 as they only referred to respiration without being specific.

For mp4 it was key to refer to brain cells, not just the brain or brain health.

This response gained full marks.

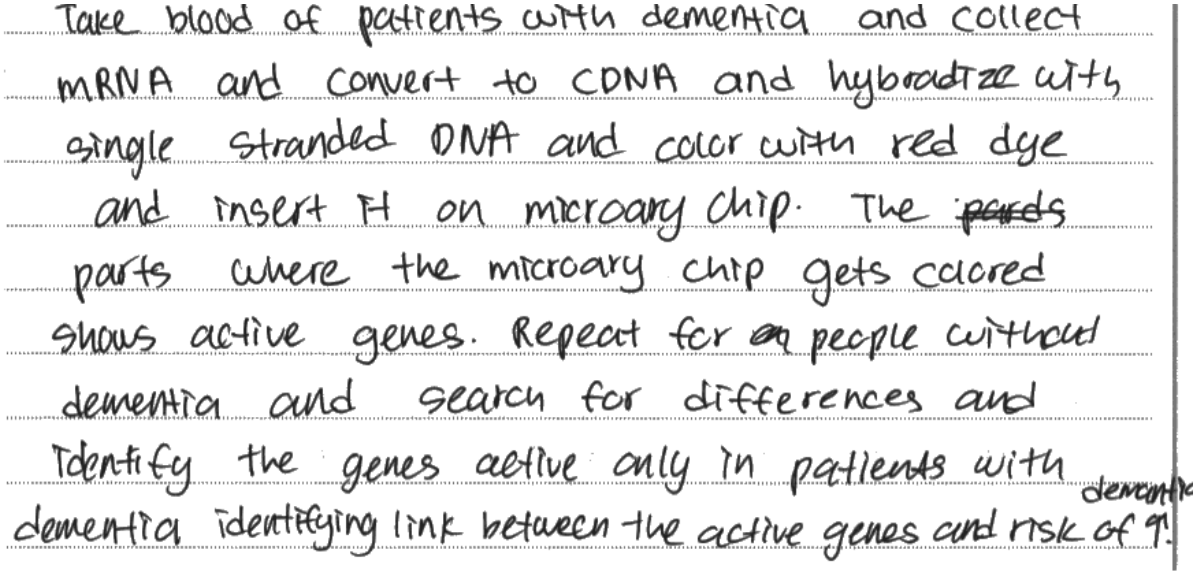

* Due to the fall in blood pressure sufficient amount of blood with oxygen and nutrients may not be supplied to the brain resulting in poor development or performance of the brain. It may also cause some of the ~~bat~~ brain cells to weaken or die.

Question 8(f)

In this question students had to describe how scientists could identify the link between genes that could be linked to a increased risk of dementia.

Most students achieve mp2 by referring to a suitable technique that could be used. Mp1 was often missed as students did not refer to using people with and without dementia. Mp3 was for identifying genes only found in people with dementia or alternatively identifying the active genes in dementia. Mp4 was for identifying family history of people with dementia.

This response obtained full marks.

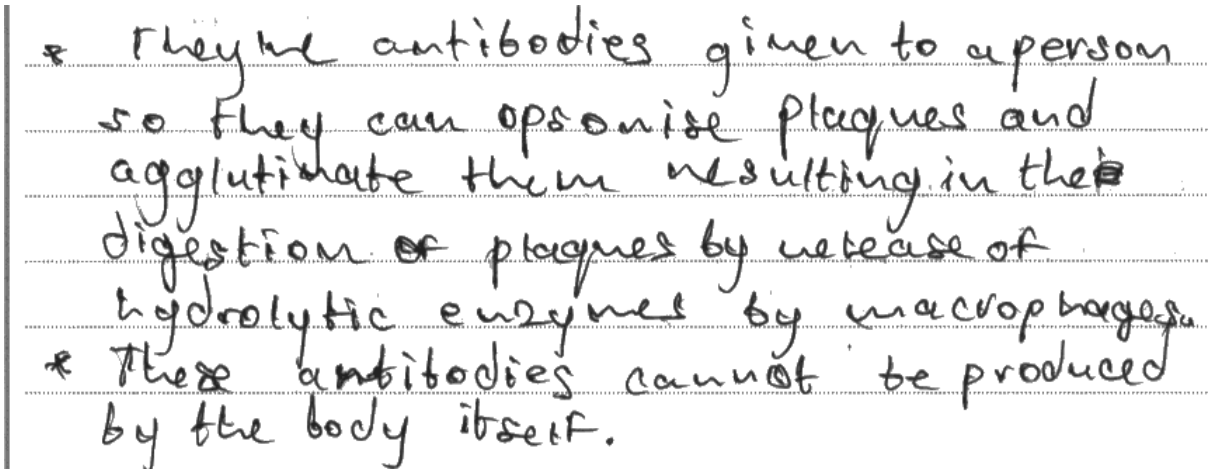

Take blood of patients with dementia and collect mRNA and convert to cDNA and hybradize with single stranded DNA and color with red dye and insert it on microary chip. The ~~pards~~ parts where the microary chip gets colored shows active genes. Repeat for ~~on~~ people without dementia and search for differences and identify the genes active only in patients with dementia identifying link between the active genes and risk of dementia.

Question 8(g)

In this question students had to describe what is meant by the term 'monoclonal antibody'.

Very few students understood what was meant by the term' monoclonal antibody' . There were quite a few blanks seen. It seemed that several students avoided answering this question. The most common response that gained credit revolved around being specific to one type of antigen opsonisation. Very few responses were seen that gain marking point 2. Surprisingly few responses gained marking point 3.

This response gained full marks.


* They're antibodies given to a person so they can opsonise plaques and agglutinate them resulting in their digestion of plaques by release of hydrolytic enzymes by macrophages.
* These antibodies cannot be produced by the body itself.

Question 8(h)

In this question students had to give one reason why a placebo was used in the donanemab trial.

The majority of students were able to suggest a suitable reason. . It was clear to see that many students had a good understanding of this aspect of the specification. The most common answers revolved around comparison or the placebo being a control. Frequent mentioned of removing bias were also seen. A few responses were seen that just described a double-blind trial.

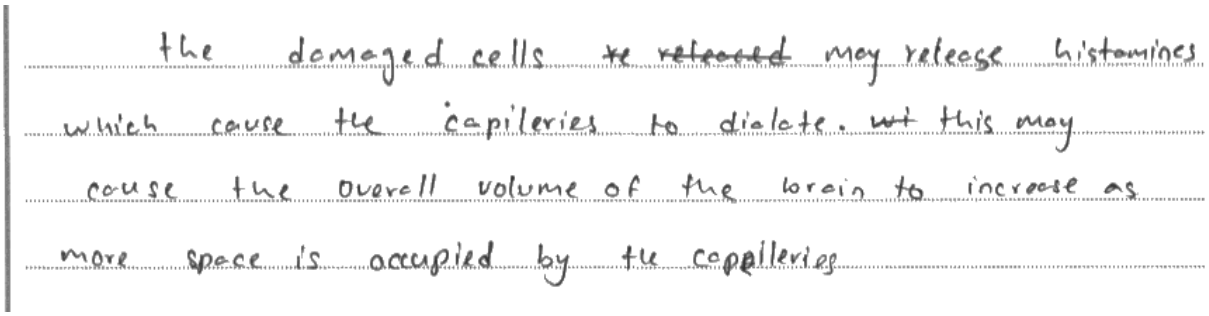
Question 8(i)

In this question students had to explain why lecanemab may result in 'brain selling'.

A significant number of responses just repeated information from the stem of the question. This did not gain them marks. The most commonly awarded marking points were mp2 for the release of histamine , mp 4 for vasodilation or increased blood flow, followed by mp3 and then mp1

Detailed responses referred to either an immune response or an inflammatory response.

This response gained full marks.



Question 8(i)

In this question students had to suggest one reason why researchers are suggesting the need to start using the drugs even earlier in the disease. Any plausible suggestion was accepted.

Some students just repeated passages from the article and this did not gain any credit. Most students understood that using drugs earlier in the disease would prevent the plaque formation and slow the development of the disease.

SUMMARY

A few suggestions for improving student performance are given below.

- students need to have time study the article and give sufficient time to answering these questions in an exam.
- students need to refer to the command word used in the question and focus their answer in an appropriate manner. Appendix 7 in the specification lists all the command words and their meaning. This is particularly true for explain, describe, and comment on as command words.
- in level-based questions the diagrams and graphs need to be used as well as relevant knowledge and understanding.
- in calculations it is better to show the workings as well as an answer. If the answer is incorrect, students may gain some credit for correct working.
- care needs to be taken in the interconversion of units – eg cm^3 to dm^3, and mm to μm.
- also in calculations care needs to be taken to ensure that the answer is in the required format eg. two significant figures, standard form and the number of decimal places.
- students must ensure that their responses are legible. There was a clear increase in writing that was very difficult to read.
- If a student puts part of an answer in a place somewhere else on the paper it is vital that the student indicates this.
- many 'suggest' questions refer to novel situations. Students need to use knowledge from the specification and apply it to this situation in specific terms rather than in generalisations.

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