

A Level Biology B

H422/02 Scientific literacy in biology

Question Set 13

1. (a) (i) The hormone erythropoietin (EPO) is produced by the kidneys.
Which cells in the body are targeted by EPO? [1]
- (ii) What change in conditions within the body would lead to an increase in the production of EPO? [1]
- (b) (i) EPO can now be produced using recombinant DNA methods. The product is called rhEPO and has been used by athletes to enhance performance. This 'blood doping' has been banned since the early 1990s and anti-doping agencies have used a combination of blood and urine tests to detect the illicit use of rhEPO.
Suggest how the use of rhEPO can be detected in a blood sample. [2]
- (ii) Suggest why it has been difficult to determine the illicit use of rhEPO in the past. [2]
- (c) (i) Patients who suffer from chronic kidney disease (CKD) often develop anaemia, the blood disorder that can occur when the body has fewer erythrocytes than normal.
rhEPO can be used in the treatment of anaemia.
Explain why the normal action of EPO in the body makes it useful as a treatment for anaemia. [1]
- (ii) Suggest why CKD patients often develop anaemia. [2]
- (iii) CKD can also trigger cardiovascular disease.
Explain how. [3]

- (c) (iv) Darbepoetin alfa can also be used to treat CKD. It is a molecule with a similar structure to rhEPO.

Researchers injected a group of CKD patients with either darbepoetin alfa or rhEPO. They measured the concentration of each drug in patients' blood for up to 96 hours after injection.

Their results are shown in Fig. 6.

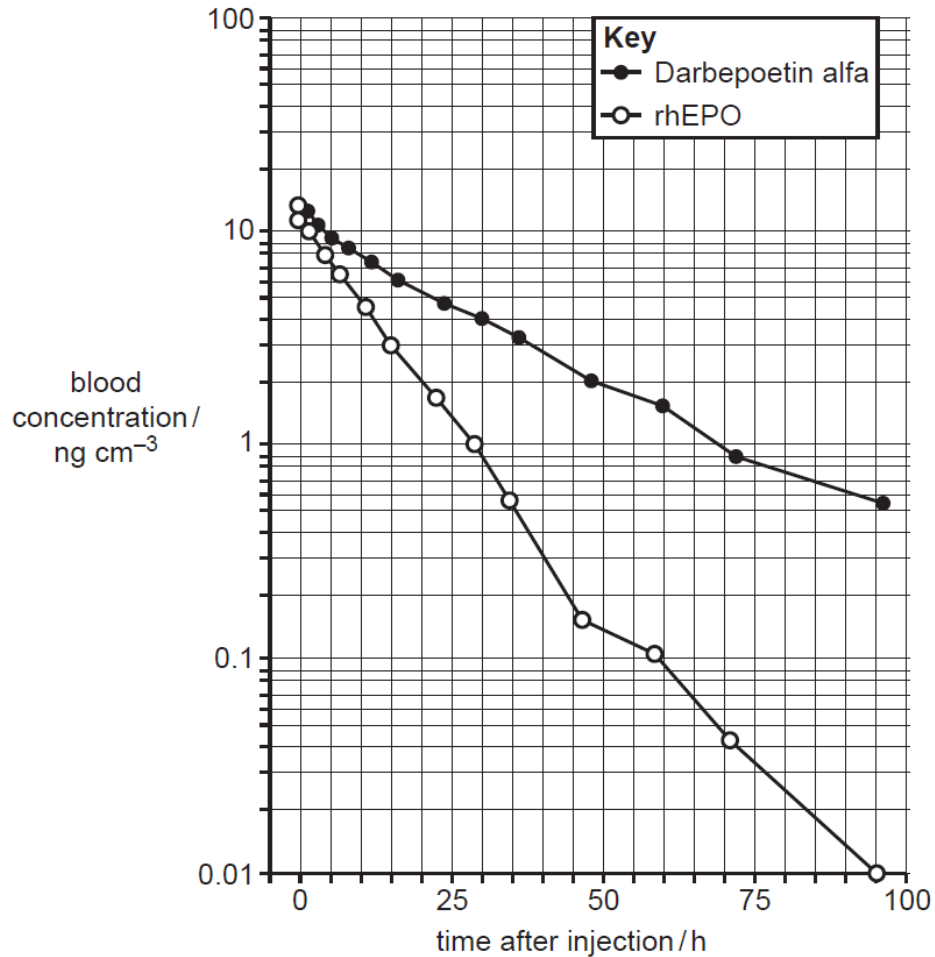


Fig. 6

A student looking at Fig. 6 stated:

After one day, there is five times more darbepoetin alfa than rhEPO remaining in the blood of patients.

Use Fig. 6 to calculate whether the student's statement is correct.

[2]

- (d) CKD patients that develop kidney failure can be treated by dialysis, but this is not a cure. A kidney transplant can remove the need for dialysis. However, transplantation carries the risk of rejection of the transplanted kidney.

Describe how it might be possible to overcome rejection of a transplanted kidney in the future.

[3]

Total Marks for Question Set 13: 17

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