

19.2 Genetic Technology Applied to Medicine

Question Paper

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| Course | CIEA Level Biology |
| Section | 19. Genetic Technology |
| Topic | 19.2 Genetic Technology Applied to Medicine |
| Difficulty | Easy |

Time allowed: 30
Score: /25
Percentage: /100

Question 1a

The production of proteins to benefit humans using recombinant DNA technology utilises cells from both prokaryotic and from eukaryotic organisms.

Explain why the production of such proteins is usually carried out by eukaryotic cells, such as yeasts or animal cells in culture, rather than by prokaryotic cells.

[2 marks]

Question 1b

State **three** advantages of using genetic engineering to produce recombinant human proteins.

[3 marks]

Question 1c

Column 1 of Fig. 1 shows three separate human proteins that have been produced successfully using genetic modification of a separate organism.

| Column 1 Recombinant human protein | Column 2 Where produced in humans | Column 3 Transgenic organism used to produce it |
|--|---|---|
| Insulin | Human blood | Hamster |
| Factor VIII | Immune system | Yeast |
| Adenosine deaminase | Pancreas | Cabbage looper moth |

Fig. 1

Join one of the boxes from Column 1 to the most appropriate box in Column 2 with a straight line.

Do the same linking the boxes in Columns 2 and 3.

[3 marks]**Question 1d**

Prior to the use of transgenic organisms to produce insulin, diabetic patients were often given injections of insulin extracted from the pancreases of pigs or cows.

State **two** advantages of treating diabetics with recombinant insulin over the use of animal-extracted insulin.

[2 marks]

Question 2a

Fig.1 below shows a representation of a gene probe.

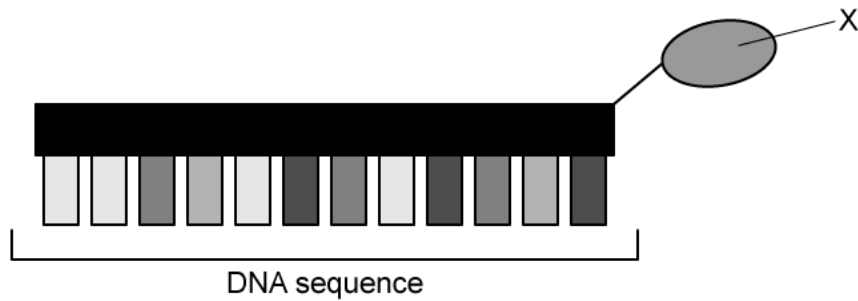


Fig. 1

Identify the part of the probe in Fig. 1 labelled **X** and describe its role.

[2 marks]

Question 2b

DNA probes are used to test for the presence of a particular allele. The DNA being tested is split into separate strands and the probe in Fig. 1 will bind to the complementary base sequence on the DNA strand.

State the name of this binding process.

[1 mark]

Question 2c

A patient decided to undergo genetic screening for a particular inherited condition.

Describe the process of genetic screening.

[3 marks]

Question 2d

The offer of a genetic screening test is often accompanied by genetic counselling.
Give **two** reasons why a patient might choose to receive genetic counselling.

[2 marks]

Question 3a

Name **two** techniques that can be used to obtain cells from a growing foetus in order for that foetus to undergo genetic screening.

[2 marks]

Question 3b

One of the main problems of finding effective gene therapies is that of gene delivery.

Give **one** explanation of why gene delivery has been largely difficult to implement.

[1 mark]

Question 3c

Some gene therapies are being developed for delivery to patients *in vivo*, whereas other are delivered *ex vivo*.

Compare and contrast the terms *in vivo* and *ex vivo* in this context.

[2 marks]

Question 3d

A couple contemplating whether to have children are concerned about the risk of their child(ren) being born with cystic fibrosis, due to the presence of cases of cystic fibrosis in their extended families in previous generations.

Both would-be parents are non sufferers of cystic fibrosis, which is a recessive condition.

Outline the choices that genetic screening may offer this couple in their family planning considerations.

[2 marks]