

Homeostasis in mammals

Question Paper 6

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Homeostasis
Sub Topic	Homeostasis in mammals
Booklet	Theory
Paper Type	Question Paper 6

Time Allowed : 54 minutes

Score : / 45

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

- 1 (a) Hormones are secreted by endocrine glands.

Explain what is meant by the term *endocrine gland*.

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..... [2]

- (b) Fig. 5.1 shows the changes in concentration in the blood of follicle stimulating hormone (FSH) and luteinising hormone (LH) during the first half of the menstrual cycle.

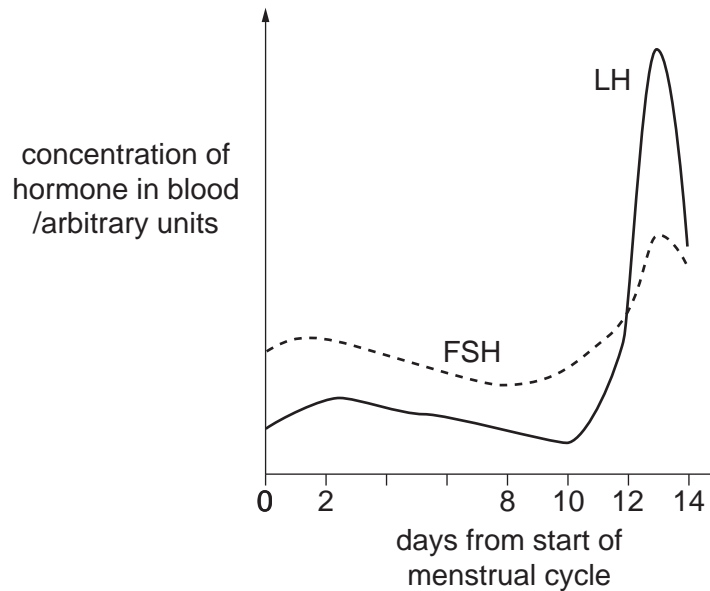


Fig. 5.1

With reference to Fig. 5.1, describe,

- (i) the changes that take place in the ovary during this time, as a result of the action of FSH

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..... [2]

- (ii) the role of LH.

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..... [1]

- (c) In preparation for in-vitro fertilisation (IVF), women are injected with FSH. Explain why treatment with FSH is a necessary preparation for IVF.

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- (d) The standard treatment with FSH and clomiphene (clomifene) causes significant side-effects. Clomiphene occupies oestrogen receptors, blocking a negative feedback mechanism.

- (i) Explain briefly what is meant by *negative feedback*.

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..... [1]

- (ii) Outline the feedback mechanism that is blocked by clomiphene.

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..... [1]

- (e) Recently a so-called ‘mild’ treatment has been introduced in the hope of avoiding the side-effects of the standard treatment. This treatment does not use clomiphene. Instead, an antagonist to LH secretion is used.

The days in the first half of the menstrual cycle on which injections of FSH and clomiphene are given in the two treatments are shown by asterisks (*) in Fig. 5.2.

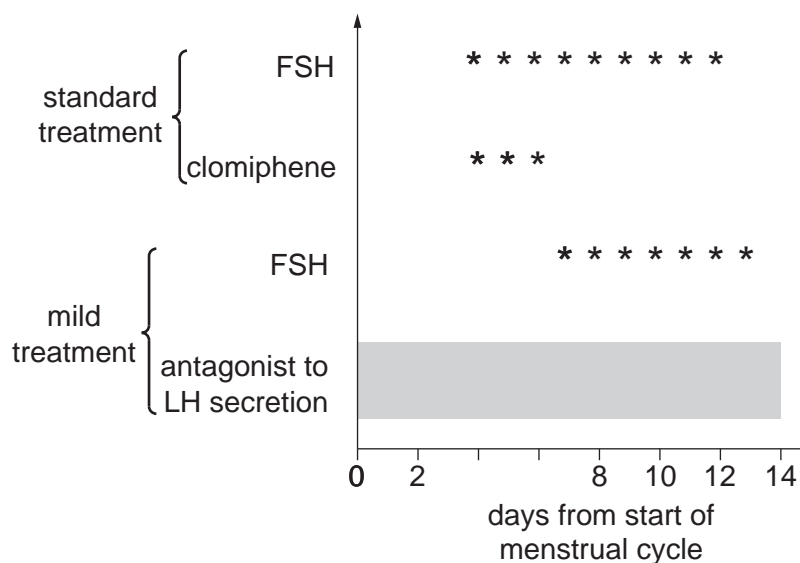


Fig. 5.2

- (i) With reference to the concentrations of LH shown in Fig. 5.1, show, using an asterisk on Fig. 5.2 when the antagonist to LH secretion should first be given.

Put your asterisk into the grey area on Fig. 5.2. [1]

(ii) Suggest why an antagonist to LH secretion forms part of the mild treatment.

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..... [1]

(f) The average dose of FSH given in the mild treatment is 1300 international units (IU), compared with an average dose of 1800 IU in the standard treatment. This could lead to the mild treatment being less effective.

The outcomes of an investigation into the two treatments are shown in Table 5.1.

Table 5.1

	mild treatment	standard treatment
mean number of oocytes harvested per treatment cycle	6.7	8.5
mean number of embryos produced per treatment cycle	2.8	3.8
percentage of pregnancies resulting in live birth	43.4	44.7

With reference to Table 5.1, compare the effectiveness of the two treatments.

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..... [3]

(g) FSH consists of two polypeptide chains which are encoded by genes on different chromosomes. The two genes, together with their promoters, have been inserted into bacteria to produce the hormone used in fertility treatments.

Explain briefly why promoters need to be transferred into the recipient bacteria together with the two genes for the FSH polypeptides.

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..... [2]

2 (a) The pancreas acts both as an exocrine and an endocrine gland.

(i) Describe the parts of the pancreas involved in its **endocrine** function.

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(ii) State precisely the group of compounds to which the pancreatic hormone insulin belongs.

..... [1]

(b) People with insulin-dependent (type 1) diabetes require regular injections of insulin. In the past the insulin used came from animal sources such as pigs. Diabetics now use human insulin that has been manufactured using gene technology.

Describe the advantages of treating diabetics with insulin produced by gene technology.

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..... [3]

[Total: 7]

- 3 Fig. 2.1 shows the changes in membrane potential in an axon during the passage of a single impulse.

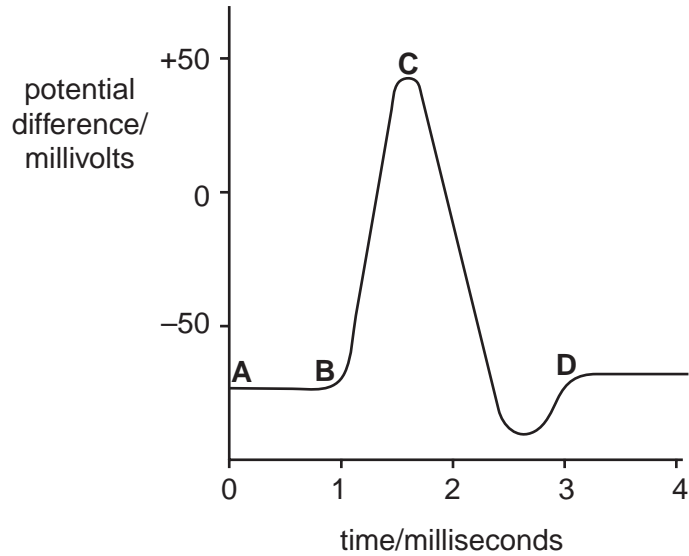


Fig. 2.1

- (a) Outline how the resting potential from A to B is maintained.

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.....[3]

- (b) Describe how the changes in the membrane bring about depolarization from B to C.

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.....[3]

(c) Explain how the membrane is repolarised from C to D.

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(d) State three differences between nervous and hormonal communication in mammals.

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2.
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3.
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[3]

[Total : 12]

- 4 Figs 3.1 and 3.2 show the concentration of glucose and insulin in blood plasma before and after a glucose drink.

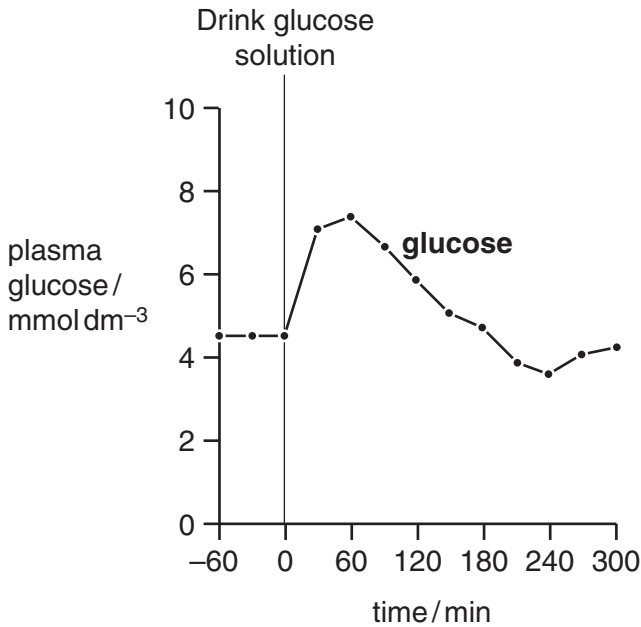


Fig. 3.1

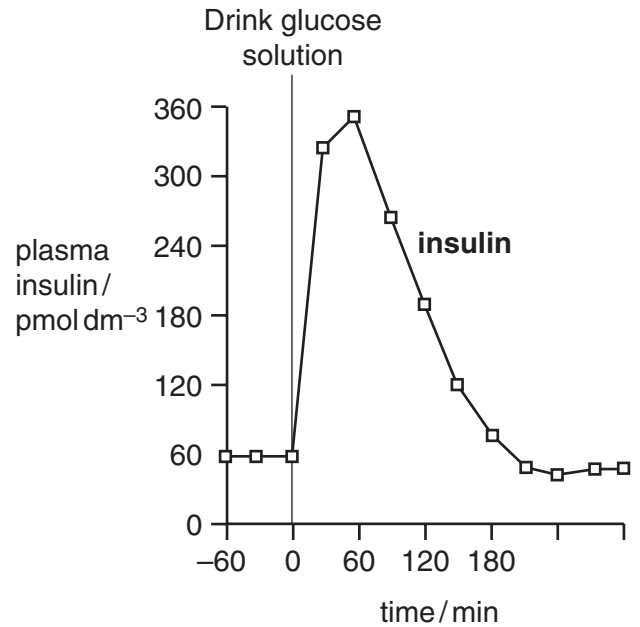


Fig. 3.2

- (a) With reference to Fig. 3.1, describe the changes in blood glucose concentration after the glucose drink.

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[3]

- (b) With reference to Fig. 3.1 and Fig. 3.2, explain how the changes in blood glucose cause:

- (i) an increase in the concentration of insulin in the plasma;

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[2]

- (ii) a subsequent fall in the concentration of insulin in the plasma.

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[2]

- (c) Describe the role of the hormone glucagon in maintaining the concentration of blood glucose.

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[Total : 10]