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Level: HL IB in Biology
Subject: Biology
Topic: IB HL Biology
Type: Topic Question

2002

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All International Baccalaureate IB Topic Questions HL Biology

BIOLOGY

HL - IB

Key skills

Question 1

Which of the following are examples of groups that could be added to the tails of histones to chemically modify them?

I. Acetyl

II. Hydroxyl

III. Phosphate

IV. Amino

A. I. and III. only

B. II. and IV. only

C. I., II. and III.

D. II., III. and IV.

[1 mark]

Question 2

In humans, during periods of hypoxia (low oxygen in tissues), the transcription factor HIF (Hypoxia-Inducible Factor) binds to the Hypoxia Response Element (HRE) sequence and increases transcription of the EPO gene. This stimulates the production of red blood cells. The diagram shows the EPO gene and regulatory elements.
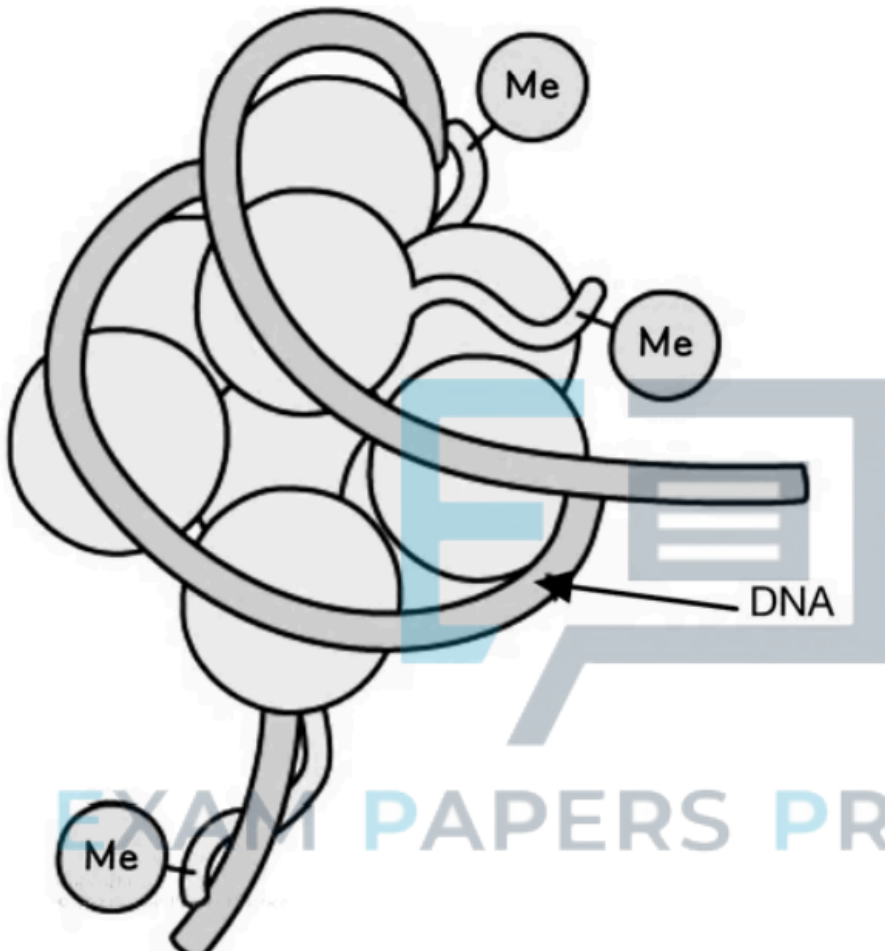

Which kind of regulatory elements are HIF and HRE?

	HIF	HRE
A	Activator protein	Enhancer sequence
B	Repressor protein	Silencer sequence
C	Enhancer sequence	Activator protein
D	General transcription factor	Enhancer sequence

[1 mark]

Question 3

The diagram below shows a nucleosome where the histone tails have had a methyl group added.

Which statement best describes the effect of methylation of histone tails?

A. Adding a methyl group causes the DNA to be less tightly wrapped

B. Adding a methyl group deactivates the gene

C. Adding a methyl group causes the DNA to be more tightly wrapped

D. Adding a methyl group helps maintain a positive charge

[1 mark]

Question 4

The simplified diagram below shows a section of DNA where a methyl (-CH₃) group has been added to a cytosine base.

Methylated cytosine

Cytosine
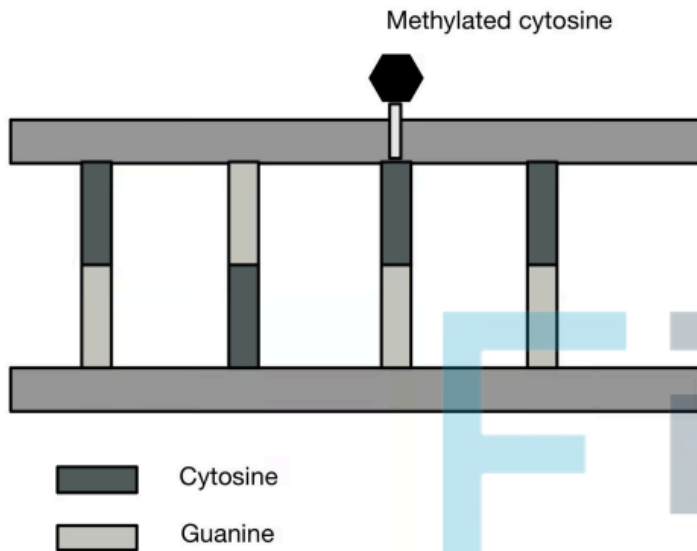
Guanine

Which of the following best describes the outcome of direct methylation of DNA?

A. It stimulates the expression of the gene.

B. It prevents guanine from forming hydrogen bonds.

C. It inhibits the binding of transcription factors.

D. It causes breaks in the phosphate deoxyribose backbone.

[1 mark]

Question 5

Which of the following statements about DNA methylation are correct?

I. DNA methylation varies throughout a lifetime.

II. DNA methylation can be affected by environmental factors.

III. Analysis of DNA methylation patterns can be used in the early detection of disease.

IV. DNA methylation can cause changes in the DNA sequence.

A. I only

B. I and II

C. I, II and III

D. All the above

[1 mark]