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Chapter 2: Gene Expression and Epigenetics

Multiple Choice

1. DNA sequences that are involved in the regulation of gene expression are called
A. cis factors.
B. trans factors.
C. attenuators.
D. repressors.

ANS: A
OBJ: 2-2

2. Which of the following is the binding site for the repressor protein of the lactose operon?
A. P site
B. Operator
C. A site
D. Promoter

ANS: B
OBJ: 2-2

3. Which of the following would prevent transcription of the lactose operon?
A. Loss of promoter
B. Presence of inducer
C. Loss of the repressor protein
D. RNA polymerase binding to the promoter

ANS: A
OBJ: 2-2

4. Which of the following is a cis factor of the lactose operon?
A. Inducer
B. Operator
C. Repressor
D. Polymerase

ANS: B

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OBJ: 2-2

5. In the lactose operon, which of the following configurations would result in gene expression?
A. Promoter +, Operator +, Repressor +, no inducer present
B. Promoter –, Operator +, Repressor +, no inducer present
C. Promoter –, Operator –, Repressor +, inducer present
D. Promoter +, Operator +, Repressor –, no inducer present

ANS: D
OBJ: 2-2

6. When gene expression is regulated by mechanisms other than the interaction of cis elements and trans factors, the regulation is called
A. induction.
B. epigenetics.
C. attenuation.
D. combinatorial control.

ANS: B
OBJ: 2-1

7. Genomic imprinting is accomplished primarily through
A. methylation.
B. acetylation.
C. transcription.
D. cis and trans factor interactions.

ANS: A
OBJ: 2-5

8. The most frequently methylated base in vertebrates is
A. adenine.
B. cytosine.
C. guanine.
D. thymine.

ANS: B

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OBJ: 2-5

9. MicroRNAs, short endogenous RNAs, perform what function in the eukaryotic cell?
A. Control of DNA replication
B. Priming RNA synthesis
C. RNA splicing
D. Repression of gene expression

ANS: D
OBJ: 2-3

10. What mechanism may explain the difference in symptoms in Prader–Willi and Angelman syndromes?
A. Genomic imprinting
B. Alternative splicing
C. Genetic recombination
D. Capping

ANS: C
OBJ: 2-5

11. Alteration of the nucleotide sequence of RNA after transcription is called
A. methylation.
B. RNA silencing.
C. RNA editing.
D. capping.

ANS: C
OBJ: 2-5

12. Which RNA results from exogenous nucleic acids?
A. siRNA
B. lncRNA
C. mRNA
D. miRNA

ANS: A

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OBJ: 2-3

13. Which DNA methyltransferase (DNMT) is responsible for maintenance of DNA methylation patterns?
A. DNMT3A
B. DNMT2
C. DNMT1
D. DNMT3B

ANS: C
OBJ: 2-5

14. Which of the following is an epigenetic mechanism?
A. Binding of transcription factors
B. DNA hairpin formation
C. Cis factors
D. DNA methylation

ANS: D
OBJ: 2-1

15. Which is a histone mark?
A. Binding of histone H1 to euchromatin
B. A modified nucleosime
C. Histone H3 tail sequence
D. Acetylation of histone H3

ANS: D
OBJ: 2-4

16. Which histone is not included in the core histones?
A. H1
B. H2B
C. H3
D. H4

ANS: A

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OBJ: 2-4

17. This is a list of histone modifications that affect gene expression.
A. Transcriptome
B. Histone code
C. Proteome
D. Genetic code

ANS: B
OBJ: 2-4

18. Methylation of lysine at position 20 in histone 2B is expressed in this way.
A. K20H2BMe
B. H2BK20Me
C. MeK20H2B
D. H2K20Me

ANS: B
OBJ: 2-4

19. Acetylation of histone H3 would result in which of the following effects?
A. Degradation of mRNA
B. Formation of heterochromatin
C. Exclusion of activator proteins
D. Increased gene expression

ANS: D
OBJ: 2-4

20. These DNA sequence structures function in epigenetic gene regulation.
A. Operators
B. CpG islands
C. Inverted repeats
D. Regulator genes

ANS: B
OBJ: 2-5

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21. Which proteins perform demethylation of DNA?
A. DNA polymerases
B. TET enzymes
C. METTL enzymes
D. TFIID protein

ANS: B
OBJ: 2-5

22. This complex is required for miRNA and siRNA association to mRNA targets.
A. Replisome
B. Retrotransposon
C. RISC
D. XIC

ANS: C
OBJ: 2-3

23. Enhancer regulation of gene expression is facilitated by this RNA.
A. lncRNA
B. miRNA
C. siRNA
D. Ri Xist RNA

ANS: A
OBJ: 2-3

24. DNA hypermethylation would have what effect of movement of retrotransposons through RNA intermediates?
A. Increase movement by activating transcription
B. Increase movement by repressing transcription
C. No effect on movement nor transcription
D. Inhibiy movement by repressing transcription

ANS: D
OBJ: 2-5

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25. Multiple products are generated from the same gene by what mechanism?
A. Alternative splicing
B. Polyadenylation
C. Capping
D. Splicing

ANS: A

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