Dietitian CE

Epigenetics in Cancer Therapy and Nanomedicine

1. Epigenetic modifications are reset in primordial germ cells, the precursors of sperm and oocytes, preparing them for development in future generations.

A. True
B. False

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2. Which epigenetic machinery has been recognized as a key regulatory mechanism during development, cellular differentiation, and tissue homeostasis?

A. DNA methylation
B. Histone post-translational modifications
C. Non-coding RNAs
D. All of the above has been recognized as a key regulatory mechanism during development, cellular differentiation, and tissue homeostasis

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3. When located in a gene promotor, DNA methylation usually marks genes for:

A. Transcriptional amplification
B. Transcriptional silencing
C. Alternative splicing
D. Post-translational modification

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4. Regardless of which histone residue is modified, _____ acetylation almost always correlates with chromatin accessibility and transcriptional activation.

A. Serine
B. Threonine
C. Tyrosine
D. Lysine

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5. One very well-characterized modification involves the phosphorylation of H2AX on _____ 139 in the presence of DNA damage. This newly phosphorylated protein, termed gamma-H2AX, is the first step in recruiting and localizing DNA repair proteins.

A. Serine
B. Threonine
C. Tyrosine
D. Lysine

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6. Which of the following is capable of controlling the expression of more than one RNA and does not need to be perfectly complementarily for degradation?

A. siRNA
B. piRNA
C. miRNA
D. lncRNA

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7. The best-studied histone modification is the acetylation of lysine on histone tails, which is dynamically regulated by:

A. Histone lysine acetyltransferases
B. Histone deacetylases
C. Both histone lysine acetyltransferases and histone deacetylases
D. Histone acetylation does not take place at lysine

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8. Isocitrate dehydrogenase 1 and 2 and ten-eleven translocation 2 are mutually exclusive and biologically redundant.

A. True
B. False

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9. Which of the following can have either an oncogenic or a tumor-suppressive function, or they can act in a context-dependent manner?

A. siRNA
B. miRNA
C. lncRNA
D. ncRNA

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10. Although single miRNA can be either up- or downregulated, the overall miRNA expression is enhanced in tumor cells.

A. True
B. False

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11. Which of the following are able to influence gene expression by regulating the epigenetic machinery, while at the same time being themselves epigenetically regulated?

A. siRNA
B. miRNA
C. lncRNA

D. ncRNA

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12. Although iDNMTs have been shown to be clinically efficacious, these drugs are not locus-specific and cause large-scale changes in gene expression, inducing not only the re-expression of genes that have been improperly silenced in cancer, but also the transcriptional activation of oncogenes and prometastatic genes.

A. True
B. False

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13. Of the four iHDACs drugs that have been approved by the USFDA, which one, approved for the treatment of patients with cutaneous T cell lymphoma, acts on class I, II, and IV HDACs and has been shown to induce apoptosis and cell cycle arrest, as well as to sensitize cancer cells to chemotherapy?

A. Belinostat
B. Vorinostat
C. Romidepsin
D. Panobinostat

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14. Promising clinical data on a number of malignancies, including chronic leukemia and colorectal, ovarian, lung, and breast cancer, are robustly demonstrating that epigenetic therapy has the potential to overcome chemotherapy resistance and re-sensitize cancer cells to previously ineffective therapies.

A. True
B. False

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15. Which of the following has been found to induce stemness in cancer cells, resulting in the enrichment of the cancer stem cell subpopulation with increased resistance?

A. Surgery
B. Radiation
C. Chemotherapy
D. All of the above

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16. Epigenetic biomarkers cannot predict therapeutic drug response.

A. True
B. False

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17. All of the following types of cancers showed the highest levels of accumulation of nanocarriers containing drugs or imaging agents, except for:

A. Liver cancer
B. Pancreatic cancer
C. Colon cancer
D. Stomach cancer

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18. All of the following are tumor-targeting ligands, except for:

A. Folates
B. Transferrins
C. RNAs
D. Peptides

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19. Direct genotoxicity of nanomaterials is principally due to oxidative stress induced by the induction of reactive oxygen species by NPs and is strongly linked to inflammatory cell response and immunotoxicity.

A. True
B. False

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20. CP-4200 is a prodrug developed by conjugating the azacytidine molecule with which fatty acid?

A. Palmitic acid
B. Elaidic acid
C. Oleic acid
D. Linolenic acid

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21. It has been reported that lipid nanocarriers can protect a drug from _____ degradation.

A. Heat
B. Enzymatic
C. Basic
D. Acidic

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22. Which of the following have been proposed as safe and biocompatible carriers especially for agents that show limited tissue penetration or are rapidly inactivated?

A. Peptides
B. Lipids

C. Erythrocytes
D. Leukocytes
