# *Nuclear Medicine and Pet CT 8th edition Waterstram-Rich Test Bank*

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**Chapter 02: Cell and Molecular Biology**
**Waterstram-Rich: Nuclear Medicine and PET/CT: Technology and Techniques, 8th Edition**

**MULTIPLE CHOICE**

1. Which of the following is an organelle of a eukaryotic cell?
   a. Photolipid
   b. Cisternae
   c. Centrosome
   d. Endocyte

   ANS: C
   The centrosome is the main site of microtubule assembly in the cell and is therefore referred to as the microtubule organizing center.

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2. The large organelle often referred to as "the control center" of the cell is the
   a. lysosome.
   b. nucleus.
   c. centrosome.
   d. Golgi body.

   ANS: B
   The nucleus is the large organelle that is often referred to as "the control center" of the cell.

   REF: p. 43

3. An organelle composed of a network of interconnected, closed, membrane-bounded vesicles that extend from the nucleus to the cell membrane is the
   a. Golgi body.
   b. endoplasmic reticulum.
   c. centrosome.
   d. lysosome.

   ANS: B
   The endoplasmic reticulum (ER) is an organelle composed of a network of interconnected, closed, membrane-bounded vesicles that extend from the nucleus to the cell membrane.

   REF: p. 42

4. Phagocytosis, endocytosis, and autophagy are processes that are performed by the
   a. Golgi bodies.
   b. ribosomes.
   c. nucleus.
   d. lysosomes.

   ANS: D
   Lysosomes degrade extracellular materials taken up by the cell through three main processes; phagocytosis, endocytosis, and autophagy.

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5. Messenger RNA (mRNA) is converted into a protein within the _____ of eukaryotic cell.
   a. nucleus
   b. mitochondria
   c. ribosome
   d. Golgi body

   ANS: C
   The process of converting (translating) mRNA into protein is carried out by ribosomes.

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6. Which term denotes the process by which a gene is transformed into messenger RNA (mRNA)?
   a. Transcription
   b. Initiation
   c. Translation
   d. Synthesis

   ANS: A
   Transcription is the process by which a gene is transcribed into mRNA. The three steps of this process are initiation, elongation, and termination.

   REF: p. 45

7. The three steps of the transcription process are
   a. initiation, elongation, and termination.
   b. interphase, prophase, and telophase.
   c. expression, translation, and suppression.
   d. synthesis, regulation, and termination.

   ANS: A
   Transcription is the process by which a gene is transcribed into mRNA. The three steps of this process are initiation, elongation, and termination.

   REF: p. 45

8. The process by which a gene is used as a template to transcribe messenger RNA (mRNA) is termed:
   a. gene mutation.
   b. gene expression.
   c. regulation.
   d. post-translation modification.

   ANS: B
   Gene expression is often described as the process by which a gene is used as a template to produce (transcribe) mRNA.

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9. All of the following are steps in gene expression, EXCEPT
   a. transcription.
   b. translation.
   c. termination.
   d. post-transcriptional modifications.

   ANS: C
   Gene expression is an extremely complex, multistep, tightly regulated process that involves hundreds of proteins and other molecules. Steps include the mechanisms of transcription, post-transcriptional modifications, translation, and post-translational modification of proteins.

   REF: p. 45

10. The phases of mitosis are
    a. interphase, metaphase, synthesis, and replication.
    b. telophase, mitosis, interphase, and S-phase.
    c. $G_0$, $G_1$, interphase, and S-phase.
    d. prophase, metaphase, anaphase, and telophase.

    ANS: D
    Mitosis is divided into four separate steps, prophase, metaphase, anaphase, and telophase, that are summarized in Table 2.1.

    REF: p. 48

11. CDK2 is the partner for both cyclins:
    a. A and E.
    b. D and E.
    c. A and B.
    d. D and B.

    ANS: A
    Cyclin E binds to CDK2 at the end of $G_1$. This interaction is required for the cell to commit to DNA replication and advances the cell into S-phase. Cyclin A binds to CDK2 during S-phase and this interaction is required to initiate the $G_2$ to M transition. See Table 2-2.

    REF: p. 49

12. Which are the three main cell cycle checkpoints?
    a. $G_1$, restriction, and metaphase/anaphase
    b. $G_1$, $G_2$/M, and mitotic spindle
    c. $G_1$, $G_2$/M, and anaphase/telophase
    d. Restriction, DMA damage, and anaphase/telophase

    ANS: B

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In addition to the complicated series of steps and layers of regulation discussed above, there are three main cell cycle checkpoints: the $G_1$ (or restriction checkpoint), the $G_2$/M checkpoint (or the DNA damage checkpoint), and the mitotic spindle checkpoint (also called the metaphase/anaphase checkpoint). These control mechanisms can detect errors that may have occurred (e.g., DNA replication errors or chromosomes that did not segregate properly) and halt progression of the cell cycle at specific points, giving the cells an opportunity to correct any errors before they are passed on to the daughter cells.

REF: p. 49

13. All of the following are the groups of genes associated with cancer, EXCEPT
    a. proto-oncogenes.
    b. angiosynthesis genes.
    c. tumor suppressor genes.
    d. DNA repair genes.

    ANS: B
    The genes associated with cancer can be classified into three groups. (1) Proto-oncogenes are genes that produce proteins that promote cell division (e.g., growth factors) or inhibit apoptosis. The mutated forms of these genes are called oncogenes and will promote unregulated cell division. (2) Tumor suppressor genes produce proteins that normally prevent cell division or promote cell death. Mutations that destroy production of tumor suppressor proteins therefore promote cell proliferation. (3) DNA repair genes produce proteins that prevent or correct mutations in DNA.

    REF: p. 50-51

14. Which term describes a group of diseases in which cells no longer respond to the normal constraints placed on their proliferation and instead grow indefinitely?
    a. Metastasis
    b. Angiogenesis
    c. Cancer
    d. Mutation

    ANS: C
    Cancer is a term used to describe a group of diseases in which cells no longer respond to the normal constraints placed on their proliferation and instead grow indefinitely.

    REF: p. 50

15. All of the following are viruses linked to cancer, EXCEPT
    a. influenza A.
    b. hepatitis B.
    c. human papilloma virus (HPV).
    d. Epstein-Barr.

    ANS: A
    Influenza A is not linked as being a cancer-causing virus.

    REF: p. 52-53

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