Porth's Pathophysiology - Concepts of Altered Health States 11th edition Norris Test Bank

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Test Generator Questions, Chapter 02: Cell and Tissue Characteristics

1. During a discussion on cellular components and their function, a student asked the instructor the purpose of messenger RNA (mRNA). Which is the most accurate answer?
A. Transports amino acids to the site of protein synthesis
B. Acts as an inner nuclear support membrane for a rigid network of protein filaments that binds DNA to the nucleus
C. Performs an active role of protein synthesis, where mRNA molecules direct the assembly of proteins on ribosomes to the cytoplasm
D. Assists cells in forming neoplastic progression by altering the response of chromatin in the nuclear matrix

Answer: C

Rationale: The nucleus is the site for the synthesis of three types of RNA that move to the cytoplasm and carry out the actual synthesis of proteins. Messenger RNA copies and carries the DNA instructions for protein synthesis to the cytoplasm. Ribosomal RNA is the site of actual protein synthesis; transfer RNA transports amino acids to the site of protein synthesis.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Understand
Client Needs: Physiological Integrity: Basic Care and Comfort
Reference: p. 16

2. The nurse is providing care for a client with a diagnosis of cirrhosis and notes that the client's sclerae are jaundiced. The nurse recalls that jaundice is a pigment that can accumulate in which part of the cell?
A. Nucleus
B. Cytoplasm
C. Golgi apparatus
D. Rough endoplasmic reticulum

Answer: B

Rationale: Pigments such as bilirubin and melanin can accumulate in the cytoplasm, resulting in the characteristic yellow skin tones associated with jaundice. Pigments do not tend to accumulate in the nucleus, Golgi apparatus, or rough endoplasmic reticulum.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Remember
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 16

3. A 14-year-old client has been experiencing severe internal cramps in the region of the pelvis and weight loss. The client has been admitted with rectal bleeding. The healthcare provider has diagnosed the client with inflammatory bowel disease (IBD). The client asks the nurse what causes this disease. Which pathophysiologic basis will guide the nurse’s response to this client?
A. Liver involvement in faulty glycogen stores
B. Endoplasmic reticulum stress in the gastrointestinal system
C. Oversecretion of insulin from the beta cells in the pancreas
D. Infiltration of the gastrointestinal tract by bacterial toxins

Answer: B

Rationale: Researchers are determining links between endoplasmic reticulum (ER) and various disease processes. For example , ER stress in the gastrointestinal system has been found to be related to intestinal inflammations such as that occur with inflammatory bowel disease. Smooth ER of the liver is involved in glycogen stores. Insulin is synthesized as a large, inactive proinsulin molecule cut apart to produce a smaller, active insulin molecule within the Golgi complex of the beta cells. Bacterial toxins have exploited the retrograde transport mechanism.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Understand
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 16-17

4. A professor is teaching a group of students about the role of mitochondria within the cell. Which statement is true of mitochondria?
A. They are the site of adenosine triphosphate (ATP) production.
B. The number of mitochondria in a cell is equal to the number of nuclei.
C. They are replicated within the smooth endoplasmic reticulum (ER).
D. Mitochondrial DNA is inherited patrilineally.

Answer: A

Rationale: Consistent with their characterization as the “power plants” of the cell, mitochondria are the site of adenosine triphosphate (ATP) synthesis for the cell. There are a varying number in each cell, according to the energy demands of the particular cell. They are self-replicating rather than being produced in the smooth endoplasmic reticulum (ER), and they are inherited matrilineally.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Understand
Client Needs: Safe, Effective Care Environment: Management of Care
Reference: p. 18-19

5. A client has been diagnosed with a neurodegenerative disease called multiple sclerosis (MS). The healthcare provider explains to the client that this disease may be caused by dysregulated apoptosis. Later that day, the client asks the nurse what this means. How should the nurse reply?
A. The cells around the nerves do not know how to die correctly.
B. The cytoplasm should neutralize the various apoptotic inhibitors but is not working correctly.
C. Dysregulated apoptosis has caused an excessive rate of programmed cell death along the neuropathways.
D. There is an inappropriately low rate of apoptosis occurring within the cells.

Answer: C

Rationale: Dysregulated apoptosis can mean too little or too much and has been implicated in neurodegenerative disease, in which there is an increased or excessive rate of apoptosis.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 18-19

6. A client experiencing immotile cilia syndrome should be frequently assessed by the nurse for which complication?
A. Epistaxis resulting from loss of cilia in the nasal passageway.
B. Bronchiectasis due to interferences with clearance of inhaled bacteria along the respiratory tract.
C. Sterility caused by inability of sperm to swim downstream.
D. Inability to hear soft sounds related to kinocilium on the hair cells in the inner ear.

Answer: B

Rationale: Immotile cilia syndrome immobilizes the cilia of the respiratory tract, thus interfering with clearance of inhaled bacteria, leading to the chronic lung disease called bronchiectasis. Epistaxis causes no loss of cilia in the nasal passage. Sterility also does not cause immotile cilia; it is the genetic defect of the flagella on sperm. This syndrome is not related to hair cells in the inner ear.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Analyze
Client Needs: Physiological Integrity: Reduction of Risk Potential
Reference: p. 19-20

7. The nurse is explaining the workings of selective serotonin reuptake inhibitors to a client with a diagnosis of depression. Within the teaching, the nurse mentions that in the nervous system, the transmission of information by neurotransmitters is:
A. synaptic signaling.
B. endocrine signaling.
C. autocrine signaling.
D. paracrine signaling.

Answer: A

Rationale: Synaptic signaling occurs in the nervous system, where neurotransmitters act only on adjacent nerve cells through special contact areas called synapses. Endocrine signaling relies on hormones carried in the bloodstream to cells throughout the body. Autocrine signaling occurs when a cell releases a chemical into the extracellular fluid that affects its own activity. With paracrine signaling, enzymes rapidly metabolize the chemical mediators and therefore act mainly on nearby cells.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Remember
Client Needs: Psychosocial Integrity

Reference: p. 20-22

8. The nurse is teaching a group of colleagues about the cell division cycle as background to caring for client in the oncology department. Which statement is true of the cell cycle?
A. Some cells lack a G_0 phase.
B. Mitosis is a process that occurs in steps over 1 to 2 days.
C. Two of the five phases of the cell cycle are mitosis and synthesis.
D. Nondividing cells such as nerve cells are said to be in the S_0 phase.

Answer: C

Rationale: Consisting of several stages, two of these phases of the cell cycle are mitosis and synthesis. Some cells lack a G_1 stage, not a G_0 phase, and mitosis is a fluid and continuous process over 1 to 1.5 hours. Nondividing cells are said to be in the G_0 phase.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Understand
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 24-25

9. A 62-year-old client collapsed while unloading a truck of heavy sacks of feed for their cattle. When the client arrived in the emergency department, blood gasses reveal a slightly acidic blood sample. The nurse caring for this client is not surprised with this result based on which pathophysiologic rationale?
A. The skeletal muscles are producing large amounts of lactic acid and release it into the bloodstream during heavy work/exercise.
B. During exercise, catabolism metabolism will break down stored nutrients and body tissues to produce energy.
C. Large amounts of free energy is released when adenosine triphosphate (ATP) is hydrolyzed and then converted into adenosine diphosphate.

D. Within the mitochondria, energy from reduction of oxygen is used for phosphorylation of adenosine diphosphate (ADP) to adenosine triphosphate (ATP).

Answer: A

Rationale: Heart muscle is efficient in converting lactic acid to pyruvic acid and then using the pyruvic acid for fuel. Pyruvate is an energy source for the heart during heavy exercise when the skeletal muscles are producing large amounts of lactic acid and releasing it into the bloodstream. Therefore, the blood sample would be acidic by nature. Catabolism will break down stored nutrients and body tissues to produce energy. Adenosine triphosphate (ATP) conversion into adenosine diphosphate (ADP) and phosphorylation of ADP to ATP are both aerobic metabolism processes.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Analyze
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 26-27

10. The healthcare provider is explaining the rationale for administering a hypotonic intravenous solution (lower concentration of solutes in its surroundings) to a client. Which mechanism of membrane transport most likely underlies this action?
A. Facilitated diffusion
B. Active transport
C. Diffusion
D. Osmosis

Answer: D

Rationale: The fact that body cells are permeable to water but not all solute particles, and the amount of solute relative to water content, underlies the choice of intravenous fluid, in healthcare. Water moves through water channels in a semipermeable membrane along a concentration gradient, moving from an area of higher to one of

lower concentration. This is the essence of osmosis, and the other mechanisms of membrane transport do not have as significant a bearing on the nursing actions.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Remember
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 28-29

11. A nurse is teaching a client with a recent diagnosis of diabetes about the roles that glucose and insulin play in the disease pathology and the fact that glucose must enter the body cell to provide energy for the client. The nurse knows that which process allows glucose to enter body cells?
A. Osmosis
B. Facilitated diffusion
C. Active transport
D. Diffusion

Answer: B

Rationale: Facilitated diffusion involves the movement of a substance like glucose from an area of high concentration, such as the bloodstream, to an area of low concentration, such as the intracellular space through the use of a transport protein. Osmosis, active transport, and diffusion do bring about the movement of glucose into body cells.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Remember
Client Needs: Physiological Integrity: Basic Care and Comfort
Reference: p. 29-30

12. A student asks the instructor about the origins of different tissues and their cellular origins during the process of development. Which statement best describes the process of cell differentiation?

A. “Cells of the hematopoietic system produce the appropriate body cells that are required at each stage of development.”
B. “A single stem cell differentiates into approximately 200 different types of cells.”
C. “A fertilized ovum undergoes a series of divisions, yielding many different cell types.”
D. “Cells differentiate into necessary body cells peaking after conception and ceasing near the time of birth.”

Answer: C

Rationale: Cell differentiation and consequent tissue types are the outcome of the series of cell divisions that occur in the fertilized ovum. It originates neither with a single stem cell nor in the hematopoietic system. Stem cells allow for limited differentiation throughout the lifespan, not only antepartum.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Understand
Client Needs: Health Promotion and Maintenance
Reference: p. 37-38

13. A nurse is providing care for a client with a diagnosis of Crohn disease. The nurse recognizes the fact that the disease involves the inflammation and irritation of the intestinal lining. Which type of tissue is most likely involved in the client's pathology?
A. Simple columnar epithelium
B. Glandular epithelium
C. Simple cuboidal epithelium
D. Stratified epithelium

Answer: A

Rationale: Simple columnar epithelium lines the intestines, and is cilia and mucus-secreting goblet cells. The intestinal tract does not consist of glandular epithelium, simple cuboidal epithelium, or stratified epithelium.

Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 41-42

14. During a crime scene investigation, the coroner confirms that rigor mortis has set in. This helps to confirm an approximate time of death. The forensic nurse can explain this process (rigor mortis) to a group of students based on the fact that:
A. troponin is being prevented from forming a cross-bridge between the actin and myosin.
B. activated by adenosine diphosphate (ADP), cross-bridges become attached to the actin filament.
C. the myosin head catalyzes the breakdown of adenosine diphosphate (ADP) to provide the energy need so that a cross-bridge can be formed.
D. at death, the body is unable to complete the actin/myosin cycle and release the coupling between the myosin and actin, creating a state of muscular contraction.

Answer: D

Rationale: As the muscle begins to degenerate after death, the sarcoplasmic cisternae release their calcium ions, which enable the myosin heads to combine with their sites on the actin molecule. As adenosine diphosphate (ADP) supplies diminish, no energy source is available to start the normal interaction between actin and myosin; the muscle is in a state of rigor until further degeneration destroys the cross-bridges between actin and myosin.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Health Promotion and Maintenance
Reference: p. 42-43

15. The home care nurse is making a home visit to a 51-year-old client with a longstanding diagnosis of multiple sclerosis. The nurse knows that the muscle wasting and weakness associated with the disease process is ultimately manifested as a failure of what normal process in muscle tissue?
A. The contraction of the epimysium
B. The surrounding of fascicles by perimysium
C. Thick myosin and thin actin filaments sliding over each other
D. The contraction of fascicles within myofibrils

Answer: C

Rationale: The contraction of skeletal muscle tissue can be characterized as the sliding action of myosin and actin. Epimysium surrounds and plays a supportive role in skeletal muscle, and perimysium similarly provides support but does not actively produce locomotion. Myofibrils are found within fascicles, not the opposite.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 42-43

16. A caregiver is working with a client who is having poorly controlled pain due to shingles. The associated pain travels to the client's nervous system via:
A. synapses.
B. axons.
C. afferent neurons.
D. efferent neurons.

Answer: C

Rationale: Afferent or sensory neurons carry information toward the central nervous system; they are involved in the reception of sensory information from the external

environment and from within the body. Efferent or motor neurons carry information away from the central nervous system; they are needed for control of muscle fibers and endocrine and exocrine glands.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Understand
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 45

17. The nurse is administering a calcium channel blocker to a client with a cardiac arrhythmia. For what side effect should the nurse assess?
A. Constipation
B. Tachycardia
C. Hypertension
D. Polyuria

Answer: A

Rationale: Smooth muscle cells in the gastrointestinal tract rely on extracellular calcium entering cells and the release of calcium from the sarcoplasmic reticulum for muscle contraction, or peristalsis. This can contribute to constipation. Calcium-blocking drugs reduce heart rate and vasoconstriction, which will lower blood pressure. These drugs do not increase urine output.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Pharmacological and Parenteral Therapies
Reference: p. 44-45

18. The nurse notes a client's $PaCO_2$ on an arterial blood gas is 55 mm Hg (7.32 kPa). The client asks if this means they have carbon dioxide poisoning. How should the nurse explain how carbon dioxide became present in the client's blood?

A. It is a normal end-product of aerobic cellular respiration, but you are not eliminating it efficiently.
B. It develops due to lack of oxygen and anaerobic metabolism, so administering oxygen will help.
C. It is inhaled from the atmosphere, but your lungs are not properly converting the carbon dioxide to oxygen.
D. Carbon dioxide builds up in the blood when cells are not performing cellular respiration properly.

Answer: A

Rationale: The presence of carbon dioxide in the blood is a normal end-product of aerobic metabolism when carbon compounds are broken down and their electrons combine with oxygen to form carbon dioxide, water, and adenosine diphosphate (ADP). Although the presence of carbon dioxide is normal, if the client has a respiratory condition that prevents the exhalation of this carbon dioxide, it can become elevated. Anaerobic metabolism produces lactic acid, not carbon dioxide. Carbon dioxide is not inhaled from the atmosphere to be converted to oxygen.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 26-27

19. A client has been told they have elevated levels of low-density lipoproteins (LDL). The client says, "I have always followed a low-cholesterol diet, so how could it be elevated?" How should the nurse respond?
A. LDL needs to be taken up into the intracellular space and this process does not work well in some people, causing LDL elevations in the blood.
B. We should review your low-cholesterol diet. There are many hidden sources you may not have been aware you were eating.

C. This type of cholesterol is protective for your blood vessels, so having it elevated is good for your cardiovascular health.
D. Diet does not really influence LDL levels; the levels depend solely on internal processes in the liver, which is determined by genetics.

Answer: A

Rationale: Low-density lipoprotein (LDL) is considered “bad” cholesterol and contributes to atherosclerosis. LDL enters cells by receptor-mediated endocytosis, which requires substances to bind to a cell-surface receptor to stimulate endocytosis. Problems with these receptors can keep LDL from entering cells, increasing LDL levels in the bloodstream. Diet can influence LDL levels in combination with genetic influences. Because the client has already tried the dietary approach, the nurse should provide the client with reasons as to why success with this approach can be limited.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Safe, Effective Care Environment: Management of Care
Reference: p. 31

20. The nurse is administering an insulin secretagogue and the client asks, "Is this an insulin pill?" What response should the nurse offer the client? This medication:
A. causes your body to release more insulin from your pancreas.
B. transforms into an insulinlike substance to lower your blood sugar.
C. causes the receptors on your cells to be more receptive to insulin.
D. prevents the absorption of sugar from your digestive tract.

Answer: A

Rationale: Beta cells in the pancreas respond to the stimulus of increased blood sugar, causing a chain of reactions that stimulates exocytosis of insulin into the bloodstream. Many drugs used to treat type 2 diabetes mellitus, such as insulin secretagogues, target

these steps to increase insulin secretion. Biguanides make insulin receptors more receptive; alpha-glucosidase inhibitors inhibit the absorption of glucose. No oral medications transform into insulin.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Pharmacological and Parenteral Therapies
Reference: p. 33

21. The nurse is caring for a client whose potassium level is 5.9 mEq/l (mmol/l) (normal: 3.5 to 5.2 mEq/l; 3.5 to 5.2 mmol/l). What treatment should the nurse be prepared to administer?
A. Medication to promote the movement of potassium into the intracellular space
B. Intravenous fluids to dilute the quantity of potassium in the plasma
C. Magnesium infusion to counteract the effects of high potassium levels on cells
D. An aldosterone antagonist to alter renal excretion of potassium

Answer: A

Rationale: Potassium ions are higher inside the cell and, when in an imbalance, an excess amount of these ions will be outside the cell resulting in hyperkalemia. The primary treatment for this is using medications to promote the movement of potassium back into the intracellular space. Intravenous fluids will not alter the degree of hyperkalemia and magnesium does not counteract the effects of potassium. An aldosterone antagonist would cause greater reabsorption of potassium from the renal tubules, making hyperkalemia worse.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Pharmacological and Parenteral Therapies
Reference: p. 36-37

22. A nurse is teaching clients about the benefits of smoking cessation. What should the nurse include as the **most accurate** reason for the development of a chronic "smoker's cough"?
A. Damage to cilia in the respiratory tract makes it necessary to cough to clear the airway.
B. Smoke is an irritant that chronically triggers the coughing centers in the brain.
C. Buildup of fluids in the alveolar spaces promotes a cough in an attempt to clear secretions.
D. Substances in the smoke interfere with gas exchange and hypoxia triggers a cough response.

Answer: A

Rationale: In the respiratory tract, cilia function in the mucociliary escalator, where they help move materials such as bacteria and dust up from the airways into the mouth so they can be swallowed. Damage to cilia causes a cough, which is then used to help remove these substances from airways. Although smoke is an irritant, this would trigger a cough when actively smoking rather than the chronic cough experienced by smokers. A cough is stimulated by substances in the airway rather than imbalances in gas exchange. Smoking does not lead to pulmonary edema, which is fluid in the alveoli.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Analyze
Client Needs: Physiological Integrity: Reduction of Risk Potential
Reference: p. 20

23. The nurse is caring for an 8-year-old client who has cystic fibrosis. What aspect of client care should be the nurse **prioritize**?
A. Nutritional status
B. Airway clearance
C. Infection control
D. Pain control

Answer: B

Rationale: Cystic fibrosis involves an abnormal chloride channel, which causes the epithelial cell membrane to be impermeable to the chloride ion. The defective chloride secretion with excessive sodium and water causes abnormally thick and viscid respiratory secretions, blocking airways. Therefore, the airway clearance is the priority; subsequent priorities are infection control, nutritional status, and pain control based on most serious potential harm to the client.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Analyze
Client Needs: Safe, Effective Care Environment: Management of Care
Reference: p. 21

24. The nurse is caring for a client preparing for a bone marrow transplant who has undergone chemotherapy and radiation therapy to destroy the existing bone marrow. The client asks how the donation can replace all the different types of blood cells. What is the nurse's **best** response?
A. We inject new bone marrow directly into the bone and from there it will create new cells.
B. The cells we are injecting are hematopoietic stem cells and can transform into different cells.
C. You will also need several transfusions of different types of blood products to replace the cells.
D. The donation contains all the different types of blood cells and will multiply once in your body.

Answer: B

Rationale: Hematopoietic stem cells are the main cells in bone marrow transplants and have the greatest potential for differentiation. This means these cells can remake all the

blood and immune cells, but they do not exist as the various types of blood cells. Bone marrow is injected intravenously, not into bone, and the blood cells are not replaced via transfusion of blood products as part of the bone marrow transplant. The new marrow (stem cells) will create the cells.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply
Client Needs: Physiological Integrity: Physiological Adaptation
Reference: p. 37

25. A community healthcare worker is explaining to a group of factory workers the importance of wearing gloves when working with strong chemicals such as turpentine and paint thinner. Which characteristic of cell membranes underlies the nurse's teaching?
A. Impermeability of cell membranes to all but lipid-soluble substances.
B. Cell membranes have a hydrophilic head and a hydrophobic tail.
C. Receptors for hormones and biologically active substances are found on cell membranes.
D. A disorder within the water channel of the cell membrane can result in cancer formation.

Answer: A

Rationale: Because cell membranes are soluble to some lipid-soluble substances such as organic solvents, such substances should be kept from direct contact with skin cells. The facts that cell membranes have a hydrophilic head and a hydrophobic tail and contain receptors for hormones and biologically active substances do not have a bearing on the nurse’s teaching. Although transmembrane proteins can pass into the intracellular environment, the nurse is not referring to proteins in the teaching.
Question format: Multiple Choice
Chapter 2: Cell and Tissue Characteristics
Cognitive Level: Apply

Client Needs: Physiological Integrity: Reduction of Risk Potential

Reference: p. 20-21

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