Arizona State University (ASU) HCR240 Human Pathophysiology Test 1 Practice (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. What progressive condition is characterized by degeneration of the basal ganglia?

   A. Multiple Sclerosis

   B. Parkinson's Disease

   C. Amyotrophic Lateral Sclerosis

   D. Guillain-Barre Syndrome

2. What does Systolic Blood Pressure measure?

   A. The force of blood against artery walls during relaxation

   B. The force of ventricular muscle contractions

   C. The pressure in the aorta during diastole

   D. The amount of blood in the veins

3. Messenger RNA (mRNA) is synthesized from which type of template?

   A. Protein template

   B. RNA template

   C. DNA template

   D. rRNA template

4. Where inside the cell is ATP produced?

   A. Nucleus

   B. Ribosomes

   C. Mitochondria

   D. Lysosomes

5. Which cells produce autoantibodies that are involved in Myasthenia gravis?

   A. T-cells

   B. B-cells

   C. Macrophages

   D. Dendritic cells

6. What type of defects are known as hereditary defects?

A. Infections acquired at birth

B. Genetic defects

C. Environmental defects

D. Injuries sustained at birth

7. What is the primary function of transfer RNA (tRNA)?

A. Binding DNA during replication

B. Directing polypeptide synthesis

C. Synthesizing mRNA

D. Facilitating the entrance of amino acids into ribosomes

8. What is the typical causative agent associated with Encephalitis?

A. Streptococcus pneumoniae

B. Herpes Simplex Virus (HHV-1)

C. Escherichia coli

D. Neisseria meningitidis

9. What is the inflammatory mediator that is specifically linked to causing pain after an injury?

A. Prostaglandin

B. Bradykinin

C. Histamine

D. Nitric oxide

10. What is recognized as the #1 autosomal dominant disorder in the U.S.?

A. Huntington's Disease

B. Familial hypercholesterolemia

C. Marfan Syndrome

D. Neurofibromatosis

Answers

1. B
2. B
3. C
4. C
5. B
6. B
7. B
8. B
9. B
10. B

Explanations

1. What progressive condition is characterized by degeneration of the basal ganglia?

A. Multiple Sclerosis

B. Parkinson's Disease

C. Amyotrophic Lateral Sclerosis

D. Guillain-Barre Syndrome

Parkinson's Disease is characterized by the progressive degeneration of the basal ganglia, which is a group of nuclei in the brain responsible for coordinating movement and regulating various motor functions. This condition specifically affects the dopaminergic neurons in the substantia nigra, a part of the basal ganglia. The loss of these neurons leads to a decrease in dopamine levels, resulting in the hallmark symptoms of Parkinson's, such as tremors, rigidity, and bradykinesia. The degeneration within the basal ganglia affects the control of involuntary and voluntary movements, leading to the characteristic motor symptoms associated with the disease. Over time, the condition can also impact cognitive functions and overall quality of life, making it a progressive neurological disorder.

2. What does Systolic Blood Pressure measure?

A. The force of blood against artery walls during relaxation

B. The force of ventricular muscle contractions

C. The pressure in the aorta during diastole

D. The amount of blood in the veins

Systolic blood pressure measures the force of ventricular muscle contractions. Specifically, it represents the maximum pressure in the arteries during the phase of the cardiac cycle when the ventricles contract and pump blood into the aorta and the rest of the body. This pressure is crucial for understanding the dynamics of blood flow and cardiovascular health. It reflects how effectively the heart is functioning and how well it is supplying blood to the tissues, indicating the health of the cardiovascular system. In contrast, the other options refer to different aspects of cardiovascular function. The pressure during diastole, for example, is related to the relaxation phase of the heart cycle, and is not what systolic pressure captures. Similarly, the amount of blood in the veins pertains to venous return and is not directly measured by systolic blood pressure. Each option addresses distinct physiological phenomena, but only the correct answer pertains specifically to the action and force of the heart's contraction during systole.

3. Messenger RNA (mRNA) is synthesized from which type of template?

A. Protein template

B. RNA template

C. DNA template

D. rRNA template

The synthesis of messenger RNA (mRNA) occurs through a process called transcription, during which a specific segment of DNA is used as a template. This DNA template contains the necessary genetic information that dictates the sequence of nucleotides in the mRNA molecule. During transcription, RNA polymerase binds to the DNA at a specific region known as the promoter. It then unwinds the DNA helix and begins synthesizing the mRNA strand by pairing ribonucleotides with their complementary deoxyribonucleotide bases on the DNA template. This results in a single-stranded mRNA molecule that carries the code for protein synthesis, which will be translated later in the process of gene expression. The other types of templates mentioned do not serve as templates for mRNA synthesis. Proteins cannot be templates for nucleic acid synthesis, as they are translated from mRNA rather than transcribing mRNA themselves. Furthermore, while RNA can interact in various biological processes, it is not the primary template for mRNA synthesis; instead, mRNA is synthesized from DNA. Ribosomal RNA (rRNA) is involved in the formation of ribosomes but does not serve as a template for mRNA synthesis. Thus, the correct and appropriate template for mRNA synthesis is

4. Where inside the cell is ATP produced?

A. Nucleus

B. Ribosomes

C. Mitochondria

D. Lysosomes

The production of ATP occurs primarily in the mitochondria, which are often referred to as the "powerhouses" of the cell. This organelle is specifically designed for energy metabolism, where the process of oxidative phosphorylation takes place. In the mitochondria, nutrients such as glucose are converted into energy through a series of biochemical reactions known as the citric acid cycle and the electron transport chain. During these processes, adenosine triphosphate (ATP) is synthesized, serving as the main energy currency of the cell that powers various cellular functions. In contrast to the mitochondria, the nucleus is primarily responsible for storing genetic material and managing cellular activity through gene expression. Ribosomes are the sites of protein synthesis and do not contribute to ATP production. Lysosomes, on the other hand, are involved in breaking down waste materials and cellular debris but are not involved in the energy production process. Thus, the mitochondria stand out as the specific site for ATP synthesis in the cell.

5. Which cells produce autoantibodies that are involved in Myasthenia gravis?

A. T-cells

B. B-cells

C. Macrophages

D. Dendritic cells

In the context of Myasthenia gravis, B-cells play a critical role in the disease's pathophysiology. Myasthenia gravis is characterized by the production of autoantibodies that specifically target acetylcholine receptors at the neuromuscular junction. This interaction between autoantibodies and acetylcholine receptors disrupts normal communication between nerves and muscles, leading to the muscle weakness associated with the condition. B-cells are a type of white blood cell that is essential for the immune response, and they are responsible for producing antibodies. When triggered by specific antigens, B-cells differentiate into plasma cells, which then produce and secrete these autoantibodies. In Myasthenia gravis, these autoantibodies block and eventually destroy the acetylcholine receptors, which contributes to the clinical symptoms experienced by patients. Understanding the role of B-cells helps in grasping the autoimmune aspect of Myasthenia gravis and underscores the importance of antibody-mediated processes in the disease.

6. What type of defects are known as hereditary defects?

A. Infections acquired at birth

B. Genetic defects

C. Environmental defects

D. Injuries sustained at birth

Hereditary defects are primarily referred to as genetic defects, which arise from mutations in genes that can be passed down from parents to their offspring. These genetic changes can occur in various forms, including single-gene mutations, chromosomal abnormalities, or a combination of multiple gene interactions that lead to inherited conditions. Because these defects originate from genetic material, they can manifest in individuals as a result of lineage rather than exposure or injury. In contrast, infections acquired at birth, environmental defects, and injuries sustained at birth do not originate from genetic sources. Instead, they are influenced by external factors or circumstances surrounding the birth process. Thus, identifying hereditary defects specifically as genetic defects highlights the critical role of genetics in understanding the origins of certain health conditions.

7. What is the primary function of transfer RNA (tRNA)?

A. Binding DNA during replication

B. Directing polypeptide synthesis

C. Synthesizing mRNA

D. Facilitating the entrance of amino acids into ribosomes

The primary function of transfer RNA (tRNA) is to direct polypeptide synthesis. tRNA serves as the adapter molecule that translates the genetic code carried by messenger RNA (mRNA) into a specific sequence of amino acids to form proteins. Each tRNA molecule is responsible for bringing a particular amino acid to the ribosome, the site of protein synthesis. During translation, the anticodon region of tRNA pairs with the corresponding codon on the mRNA strand, ensuring that the correct amino acid is incorporated into the growing peptide chain based on the sequence of the mRNA. This process is crucial for building proteins that perform various functions within the cell and organism. Other functions mentioned, such as binding DNA during replication, synthesizing mRNA, or facilitating the entrance of amino acids into ribosomes, do not accurately describe the role of tRNA. These processes involve other molecules and mechanisms, specifically DNA polymerases for replication and ribosomal RNA (rRNA) in the ribosome for translation, but tRNA's main role remains the direct involvement in translating genetic information into functional proteins.

8. What is the typical causative agent associated with Encephalitis?

A. Streptococcus pneumoniae

B. Herpes Simplex Virus (HHV-1)

C. Escherichia coli

D. Neisseria meningitidis

Herpes Simplex Virus (HHV-1) is commonly recognized as a significant causative agent of encephalitis, particularly viral encephalitis. This virus can lead to acute inflammation of the brain, presenting various neurological symptoms such as fever, headache, confusion, and seizures. The pathophysiology involves the virus infecting the central nervous system, often resulting in a severe inflammatory response. While other pathogens can cause encephalitis, the association of HHV-1 with this condition is well-documented, indicating that it is a primary and serious cause of encephalitis cases, especially in certain populations such as infants and immunocompromised individuals. This makes it a key focus in understanding and diagnosing encephalitis in clinical settings.

9. What is the inflammatory mediator that is specifically linked to causing pain after an injury?

A. Prostaglandin

B. Bradykinin

C. Histamine

D. Nitric oxide

Bradykinin is the inflammatory mediator specifically linked to causing pain after an injury due to its role as a potent pain-producing agent. When tissues are injured, bradykinin is released and it acts on nerve endings to enhance the sensation of pain. It does so by activating specific receptors that promote pain signaling pathways in the peripheral nervous system. Bradykinin also contributes to the overall inflammatory response, facilitating blood vessel dilation and increasing vascular permeability which leads to swelling in the affected area. This combination of promoting inflammation and directly stimulating nociceptive neurons makes it a critical mediator in the experience of pain following injury. While other mediators like prostaglandins also play a role in pain and inflammation, bradykinin is more specifically recognized for its direct action on pain pathways. Prostaglandins typically contribute to the sensitization of pain receptors, while histamine serves more in allergic responses and increasing blood flow and nitric oxide primarily acts as a vasodilator. Thus, bradykinin's particular mechanism of enhancing pain perception after an injury distinguishes it as the primary mediator of interest in this context.

10. What is recognized as the #1 autosomal dominant disorder in the U.S.?

A. Huntington's Disease

B. Familial hypercholesterolemia

C. Marfan Syndrome

D. Neurofibromatosis

Familial hypercholesterolemia is recognized as a significant autosomal dominant disorder in the U.S. and is characterized by elevated cholesterol levels, which lead to an increased risk of cardiovascular disease. This condition arises from mutations in the LDL receptor gene, resulting in poor clearance of low-density lipoprotein (LDL) from the bloodstream. Individuals with familial hypercholesterolemia can inherit one copy of the mutated gene from an affected parent, leading to high cholesterol levels from a young age. The substantial health implications associated with familial hypercholesterolemia, including early onset heart disease, underscore its impact on public health. Effective management often requires a combination of lifestyle changes and pharmacologic interventions to lower cholesterol levels and mitigate cardiovascular risk. In contrast, while Huntington's Disease, Marfan Syndrome, and Neurofibromatosis are all notable autosomal dominant disorders, familial hypercholesterolemia is particularly prevalent in discussions of autosomal dominant conditions affecting cholesterol metabolism and cardiovascular health.