

New CED - Biological Basis of Behavior Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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SAMPLE

Questions

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- 1. Which area of the cerebral cortex is primarily involved in higher mental functions such as learning and memory?**
 - A. Association areas**
 - B. Primary sensory areas**
 - C. Motor cortex**
 - D. Auditory cortex**
- 2. Which aspect of language deals with the rules and structure that govern sentence formation?**
 - A. Phonetics**
 - B. Syntax**
 - C. Semantics**
 - D. Morphology**
- 3. What is meant by genetic predisposition?**
 - A. A learned behavior affected by environment**
 - B. A tendency for traits to be inherited**
 - C. A plan for personal development**
 - D. An acquired skill or ability**
- 4. What term describes the state of a neuron when it is not sending signals or being stimulated?**
 - A. Resting potential**
 - B. Activation potential**
 - C. Refractory period**
 - D. Hyperpolarization**
- 5. Which part of the limbic system is primarily responsible for processing and storing factual memories?**
 - A. Amygdala**
 - B. Cerebellum**
 - C. Hippocampus**
 - D. Thalamus**

- 6. What technique is used to reveal brain activity by comparing blood flow in successive MRI scans?**
- A. Functional MRI (fMRI)**
 - B. Single Photon Emission Computed Tomography (SPECT)**
 - C. Electrocardiogram (ECG)**
 - D. Neuromagnetic Imaging**
- 7. What type of substance inhibits the transport of neurotransmitter molecules back into the presynaptic terminal?**
- A. Reuptake inhibitor**
 - B. Agonist**
 - C. Antagonist**
 - D. Neuromodulator**
- 8. What is the role of receptor sites on the receiving neuron?**
- A. To generate action potentials only**
 - B. To absorb excess neurotransmitters**
 - C. To bind neurotransmitters and influence neural impulses**
 - D. To transmit signals to neighboring neurons**
- 9. What condition involves the degeneration of the myelin sheath leading to slowed communication between muscles and brain?**
- A. Multiple sclerosis**
 - B. Alzheimer's disease**
 - C. Parkinson's disease**
 - D. Huntington's disease**
- 10. Which neurotransmitter is specifically linked to pain perception and immune response?**
- A. Endorphin**
 - B. Dopamine**
 - C. Substance P**
 - D. Serotonin**

Answers

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

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Explanations

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1. Which area of the cerebral cortex is primarily involved in higher mental functions such as learning and memory?

A. Association areas

B. Primary sensory areas

C. Motor cortex

D. Auditory cortex

The association areas of the cerebral cortex play a crucial role in integrating information from different sensory modalities and are specifically involved in higher mental functions. These areas are responsible for complex cognitive processes such as learning, memory, reasoning, and problem-solving. Unlike primary sensory areas, which are focused on processing specific types of sensory information (like visual, auditory, or tactile input), or the motor cortex, which is involved solely in the planning and execution of movement, the association areas facilitate the synthesis and interpretation of information. This makes them essential for advanced functions that require the integration of past experiences and current perceptions to guide behavior and decision-making. Accordingly, they are integral to understanding how we learn new information and retrieve memories, reflecting their importance in cognitive function.

2. Which aspect of language deals with the rules and structure that govern sentence formation?

A. Phonetics

B. Syntax

C. Semantics

D. Morphology

The correct answer is B because syntax specifically refers to the arrangement of words and phrases to create well-formed sentences in a language. It encompasses the rules that govern sentence structure, including the order of words and how various components of a sentence fit together to convey meaning. Syntax is essential for understanding how different phrases can alter the meaning of a sentence, contributing to clear and effective communication. Phonetics relates to the sounds of speech and how they are produced, which is not directly about sentence structure. Semantics involves the meaning of words and sentences, focusing on understandings around meaning rather than their structural formation. Morphology deals with the internal structure of words and how they are formed from morphemes, which are the smallest units of meaning. While all these aspects are important in the study of language, only syntax directly addresses the rules governing how sentences are formed.

3. What is meant by genetic predisposition?

- A. A learned behavior affected by environment
- B. A tendency for traits to be inherited**
- C. A plan for personal development
- D. An acquired skill or ability

Genetic predisposition refers to the inherent tendency for certain traits or characteristics to be passed down from parents to offspring through genes. This concept acknowledges that individuals may have a genetic basis for certain behaviors, health conditions, or physical traits, which can influence their likelihood of developing particular attributes or conditions in their lifetime. For example, a person may have a genetic predisposition to certain diseases, such as heart disease or diabetes, which can affect their health outcomes but does not guarantee that they will definitely develop these conditions. The other options discuss concepts unrelated to the genetic basis of behavior. Learned behavior is influenced by environmental factors and experiences and doesn't stem from genetic inheritance. A plan for personal development pertains to individual goals and strategies for growth rather than biological inheritance. An acquired skill or ability refers to competencies gained through experience and practice, rather than being instilled through genetics. These options highlight different aspects of behavior and development, but none captures the essence of genetic predisposition, which revolves around inherited traits influenced by genetics.

4. What term describes the state of a neuron when it is not sending signals or being stimulated?

- A. Resting potential**
- B. Activation potential
- C. Refractory period
- D. Hyperpolarization

The state of a neuron when it is not sending signals or being stimulated is referred to as the resting potential. During this period, the neuron maintains a stable, negative internal charge relative to the outside environment, typically around -70 millivolts. This resting state is crucial for the neuron to be prepared for action potentials, which occur when the neuron is activated by stimuli. Resting potential is maintained by the distribution of ions across the neuron's membrane, particularly sodium and potassium ions, with sodium channels being closed and potassium channels allowing limited permeability. This electrical gradient is fundamental for the signaling processes of neurons. The other terms in the choices refer to different aspects of neuronal signaling. The activation potential is not a standard term; rather, action potential is used to describe the rapid rise and fall of voltage during signal transmission. The refractory period refers to the time following an action potential when a neuron is unable to fire another action potential due to ion channel dynamics. Hyperpolarization is a phase where the membrane potential becomes more negative than the resting potential, but it still occurs within the context of action potentials and is not indicative of the resting state.

5. Which part of the limbic system is primarily responsible for processing and storing factual memories?

- A. Amygdala**
- B. Cerebellum**
- C. Hippocampus**
- D. Thalamus**

The hippocampus is vital for the processing and storage of factual memories, also known as declarative memories. This area of the limbic system aids in forming new memories and connecting them to relevant emotions and experiences. When new information is learned, it is temporarily held in various regions of the brain before being consolidated into long-term memory, an essential function served by the hippocampus. In contrast, the amygdala primarily processes emotions and is more involved in the formation of emotional memories rather than factual recall. The cerebellum plays a significant role in coordinating movement and balance, and while it has some involvement in procedural memories (skills and tasks), it is not responsible for processing factual memories. The thalamus is a relay station for sensory information and is important for alertness and awareness but does not directly engage in memory processing. Thus, the hippocampus is the correct answer because of its critical role in encoding and storing factual information.

6. What technique is used to reveal brain activity by comparing blood flow in successive MRI scans?

- A. Functional MRI (fMRI)**
- B. Single Photon Emission Computed Tomography (SPECT)**
- C. Electrocardiogram (ECG)**
- D. Neuromagnetic Imaging**

Functional MRI (fMRI) is the appropriate technique for revealing brain activity by comparing blood flow in successive MRI scans. This method depends on the principle that blood flow increases to neural regions that are more active during specific tasks or cognitive processes. fMRI utilizes the BOLD (Blood Oxygen Level Dependent) contrast mechanism, which detects changes in blood oxygenation and flow that occur in response to neural activity. When a particular area of the brain is engaged, it consumes more oxygen, which leads to increased blood flow to that region. By taking rapid series of MRI scans, researchers can track this dynamic change over time and construct a map of brain activity corresponding to specific tasks or stimuli. This technique provides insight into brain function in a non-invasive manner and is widely used in research and clinical settings, making it a fundamental tool in neuroscience for understanding the correlates of cognition and behavior.

7. What type of substance inhibits the transport of neurotransmitter molecules back into the presynaptic terminal?

A. Reuptake inhibitor

B. Agonist

C. Antagonist

D. Neuromodulator

The correct answer is a reuptake inhibitor. Reuptake inhibitors are substances that prevent the reabsorption of neurotransmitters by the presynaptic neuron after they have been released into the synaptic cleft. By blocking this reuptake process, these substances increase the concentration of neurotransmitters in the synaptic cleft, enhancing their effects on the postsynaptic receptors and prolonging their action. For instance, many antidepressants are designed as selective serotonin reuptake inhibitors (SSRIs), which specifically prevent the reuptake of serotonin, leading to an increase in its availability for binding to postsynaptic receptors. This mechanism is crucial in modulating mood and emotional response. In contrast, agonists are substances that bind to and activate receptors, mimicking the action of neurotransmitters, while antagonists block the actions of neurotransmitters by binding to the same receptors. Neuromodulators, on the other hand, are substances that influence the activity of neurotransmitters but do not directly inhibit their reuptake. Understanding the function of reuptake inhibitors is vital in neuropharmacology and treatment strategies for various psychological conditions.

8. What is the role of receptor sites on the receiving neuron?

A. To generate action potentials only

B. To absorb excess neurotransmitters

C. To bind neurotransmitters and influence neural impulses

D. To transmit signals to neighboring neurons

The correct choice highlights the critical function of receptor sites on the receiving neuron, which is to bind neurotransmitters released from the sending neuron. When neurotransmitters attach to these receptor sites, they trigger various responses that can influence the likelihood of the neuron producing an action potential. This binding can either facilitate or inhibit neural impulses depending on the type of neurotransmitter and receptor involved, thus playing a key role in communication between neurons. This process is essential for the overall functioning of the nervous system as it allows for the modulation of signals required for tasks such as muscle movement, sensory processing, and various cognitive functions. The intricate interplay between neurotransmitters and their respective receptors is fundamental to synaptic transmission and the processing of information in the brain.

9. What condition involves the degeneration of the myelin sheath leading to slowed communication between muscles and brain?

- A. Multiple sclerosis**
- B. Alzheimer's disease**
- C. Parkinson's disease**
- D. Huntington's disease**

The condition characterized by the degeneration of the myelin sheath, which results in slowed communication between the brain and muscles, is indeed multiple sclerosis. In multiple sclerosis, the immune system attacks the myelin, a protective layer surrounding nerve fibers in the central nervous system. This damage disrupts the efficient transmission of electrical impulses along the nerves, leading to a variety of physical and cognitive symptoms. The implications of myelin sheath loss are significant, as it can result in symptoms such as muscle weakness, coordination issues, and sensory disturbances, thereby impacting movement and function. Multiple sclerosis is an autoimmune disorder, and its symptoms can vary widely among individuals precisely due to the location and extent of myelin damage. In contrast, Alzheimer's disease primarily affects memory and cognitive functions but is not directly related to myelin degeneration. Parkinson's disease involves the death of dopamine-producing neurons, primarily affecting motor control and leading to tremors and rigidity, but it does not primarily involve the degeneration of myelin. Huntington's disease is a genetic disorder leading to progressive degenerative changes in the brain, especially in movement and cognitive capabilities, but it also does not relate to myelin sheath degradation. Thus, multiple sclerosis is distinctly associated with the specific pathological process of myelin degradation impacting neural communication.

10. Which neurotransmitter is specifically linked to pain perception and immune response?

- A. Endorphin**
- B. Dopamine**
- C. Substance P**
- D. Serotonin**

Substance P is a neuropeptide that plays a critical role in pain perception. It is primarily found in the central and peripheral nervous systems and is involved in transmitting pain signals from the site of injury to the brain. When tissues are damaged, Substance P is released, activating pain receptors and signaling the brain that there is an injury. In addition to its role in pain, Substance P also influences the immune response. It is known to modulate immune cell activity and can facilitate the release of pro-inflammatory mediators, thereby linking pain perception with immune processes. This dual role underscores its importance in conditions involving both pain and inflammation.