Advanced Neuroscience Principles

Neuroscience · Practice Test · 20 Questions

1. Which specific ion channel is primarily responsible for the repolarization phase of an action potential in a neuron?

A) Voltage-gated sodium channel
B) Voltage-gated potassium channel
C) Ligand-gated chloride channel
D) Calcium-activated sodium channel

2. What is the primary excitatory neurotransmitter in the adult human central nervous system?

A) GABA
B) Dopamine
C) Glutamate
D) Acetylcholine

3. Which structure within the limbic system is most critically involved in the formation of new declarative memories?

A) Amygdala
B) Hippocampus
C) Hypothalamus
D) Thalamus

4. During synaptic transmission, which ion enters the presynaptic terminal to trigger the exocytosis of neurotransmitter vesicles?

A) Potassium
B) Sodium
C) Magnesium
D) Calcium

5. What is the primary function of the myelin sheath produced by oligodendrocytes in the central nervous system?

A) To provide structural support to the cell body
B) To facilitate saltatory conduction of nerve impulses
C) To store neurotransmitters for rapid release
D) To synthesize proteins for synaptic repair

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6. Which lobe of the human cerebral cortex is primarily responsible for processing visual information?

A) Frontal
B) Parietal
C) Temporal
D) Occipital

7. The 'all-or-none' principle of action potentials refers to which of the following properties?

A) The intensity of a stimulus dictates the amplitude of the action potential
B) The axon must fire at a maximum frequency at all times
C) An action potential occurs fully or not at all once threshold is reached
D) All neurons in a circuit must fire simultaneously for a response to occur

8. Which glial cell type is primarily responsible for forming the blood-brain barrier?

A) Microglia
B) Astrocytes
C) Ependymal cells
D) Satellite cells

9. What is the term for the gap between two neurons where information is chemically transmitted?

A) Axon hillock
B) Synaptic cleft
C) Node of Ranvier
D) Dendritic spine

10. In which region of the brain is the primary motor cortex located?

A) Precentral gyrus of the frontal lobe
B) Postcentral gyrus of the parietal lobe
C) Superior temporal gyrus
D) Cingulate gyrus

11. Which neurotransmitter is most directly associated with the reward pathway and the reinforcement of motivated behaviors?

A) Serotonin
B) Dopamine
C) GABA
D) Noradrenaline

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12. What is the resting membrane potential of a typical mammalian neuron?

A) -70 mV
B) 0 mV
C) +30 mV
D) -100 mV

13. Which brain structure acts as the primary relay station for sensory information (except smell) before it reaches the cortex?

A) Hypothalamus
B) Thalamus
C) Basal ganglia
D) Cerebellum

14. The phenomenon of Long-Term Potentiation (LTP) is most commonly studied in which synaptic pathway of the hippocampus?

A) Perforant path
B) Schaffer collateral pathway
C) Mossy fiber pathway
D) Striatal pathway

15. Which nervous system division is responsible for the 'fight or flight' response?

A) Parasympathetic nervous system
B) Enteric nervous system
C) Sympathetic nervous system
D) Somatic nervous system

16. Which protein complex is responsible for the 'docking' and fusion of synaptic vesicles with the presynaptic membrane?

A) SNARE complex
B) Actin filament complex
C) Myosin motor complex
D) Tubulin dimer complex

17. What occurs during the absolute refractory period of a neuron?

A) The neuron can fire again if the stimulus is strong enough
B) Sodium channels are inactivated and cannot be opened
C) Potassium channels are closed to conserve energy
D) The neuron becomes hypersensitive to sub-threshold stimuli

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18. Which ion has a much higher concentration inside the resting neuron compared to the extracellular fluid?

A) Sodium
B) Chloride
C) Potassium
D) Calcium

19. The Broca's area is typically located in which hemisphere and is associated with which function?

A) Right hemisphere; visual processing
B) Left hemisphere; speech production
C) Right hemisphere; spatial awareness
D) Left hemisphere; sensory perception

20. What is the primary role of microglia in the central nervous system?

A) Producing cerebrospinal fluid
B) Conducting electrical impulses
C) Immune defense and debris clearance
D) Myelinating axons

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