

Core Principles of Neuroscience

Neuroscience · Practice Test · 18 Questions

1. Which specific ion is primarily responsible for the repolarization phase of an action potential by flowing out of the neuron?

- A) Sodium (Na^+)
- B) Potassium (K^+)
- C) Calcium (Ca^{2+})
- D) Chloride (Cl^-)

2. The primary motor cortex is located in which specific gyrus of the frontal lobe?

- A) Superior frontal gyrus
- B) Middle frontal gyrus
- C) Precentral gyrus
- D) Postcentral gyrus

3. Which glial cells are responsible for the myelination of axons within the central nervous system?

- A) Schwann cells
- B) Astrocytes
- C) Microglia
- D) Oligodendrocytes

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

- A) GABA
- B) Glutamate
- C) Dopamine
- D) Serotonin

5. The Wernicke's area, essential for language comprehension, is typically located in which lobe of the brain?

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

6. Which structure serves as the primary relay station for sensory information (except olfaction) before it reaches the cerebral cortex?

- A) Hypothalamus
- B) Thalamus
- C) Basal ganglia
- D) Amygdala

7. What is the resting membrane potential of a typical mammalian neuron, measured in millivolts?

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

8. The blood-brain barrier is primarily maintained by the end-feet of which type of glial cell?

- A) Oligodendrocytes
- B) Ependymal cells
- C) Astrocytes
- D) Microglia

9. Which cranial nerve is responsible for the parasympathetic innervation of the heart, lungs, and digestive tract?

- A) Trigeminal nerve
- B) Facial nerve
- C) Vagus nerve
- D) Hypoglossal nerve

10. What is the functional unit of the cerebellum that receives massive excitatory input from mossy fibers and climbing fibers?

- A) Basket cell
- B) Purkinje cell
- C) Granule cell
- D) Stellate cell

11. Which neurotransmitter is most significantly depleted in the substantia nigra of patients with Parkinson's disease?

- A) Acetylcholine
- B) Dopamine
- C) Norepinephrine
- D) Glutamate

12. What phenomenon describes the strengthening of synapses based on recent patterns of activity, considered the cellular basis for learning?

- A) Long-term depression (LTD)
- B) Long-term potentiation (LTP)
- C) Synaptic pruning
- D) Neural plasticity

13. The Broca's area is classically associated with which specific cognitive function?

- A) Visual processing
- B) Auditory perception
- C) Speech production
- D) Executive decision-making

14. What is the term for the gaps in the myelin sheath where voltage-gated sodium channels are concentrated, allowing for saltatory conduction?

- A) Synaptic clefts
- B) Dendritic spines
- C) Nodes of Ranvier
- D) Axon hillocks

15. Which part of the brain is most critical for the formation of new declarative memories?

- A) Hippocampus
- B) Amygdala
- C) Cerebellum
- D) Thalamus

16. What effect does the activation of GABA-A receptors have on a postsynaptic neuron?

- A) Depolarization
- B) Hyperpolarization
- C) Action potential firing
- D) Calcium influx

17. Which lobe of the cerebral cortex contains the primary visual cortex (V1)?

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

18. The 'limbic system' is a collection of structures involved in emotional regulation; which structure within it is primarily responsible for processing fear?

- A) Cingulate gyrus
- B) Amygdala
- C) Fornix
- D) Septal nuclei