

Advanced Neuroscience Principles

Neuroscience · Practice Test · 25 Questions

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

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

2. During synaptic transmission, which protein complex is primarily responsible for the fusion of neurotransmitter-containing vesicles with the presynaptic membrane?

- A) SNARE complex
- B) Clathrin
- C) Dynein
- D) Kinesin

3. What is the primary function of the nodes of Ranvier in saltatory conduction?

- A) To produce neurotransmitters
- B) To regenerate the action potential
- C) To inhibit ion flow
- D) To synthesize myelin

4. Which glial cell type is primarily responsible for the formation of the blood-brain barrier?

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

5. In long-term potentiation (LTP), which receptor type acts as a coincidence detector due to its magnesium ion block?

- A) AMPA receptor
- B) GABA-A receptor
- C) NMDA receptor
- D) Kainate receptor

6. What is the primary inhibitory neurotransmitter in the adult human central nervous system?

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

7. Which region of the brain is the primary integration center for the regulation of the autonomic nervous system and endocrine output?

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

8. What defines the absolute refractory period of a neuron?

- A) The closure of potassium channels
- B) The inactivation of voltage-gated sodium channels
- C) The hyperpolarization of the membrane
- D) The depletion of ATP

9. Which neurotransmitter is synthesized from the amino acid tryptophan?

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

10. The primary somatosensory cortex is located in which specific lobe of the human brain?

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

11. Which component of the cytoskeleton is most abundant in neuronal axons and is vital for axonal transport?

- A) Actin filaments
- B) Microtubules
- C) Intermediate filaments
- D) Spectrin

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

- A) Myelination of axons
- B) Immune defense and debris clearance
- C) Regulation of extracellular potassium
- D) Synaptic scaffolding

13. Where are the cell bodies of the lower motor neurons that innervate skeletal muscle located?

- A) Dorsal root ganglia
- B) Ventral horn of the spinal cord
- C) Motor cortex
- D) Thalamus

14. Which cranial nerve is primarily responsible for parasympathetic innervation of the viscera?

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

15. The Broca's area, responsible for speech production, is typically located in which hemisphere and lobe?

- A) Left frontal lobe
- B) Right frontal lobe
- C) Left temporal lobe
- D) Right parietal lobe

16. Which ion has an equilibrium potential approximately equal to the resting membrane potential of a typical neuron?

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

17. Which neurotransmitter is released by preganglionic neurons in both the sympathetic and parasympathetic divisions of the autonomic nervous system?

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

18. What is the role of the enzyme acetylcholinesterase in the synaptic cleft?

- A) Synthesizing acetylcholine
- B) Degrading acetylcholine into choline and acetate
- C) Binding to postsynaptic receptors
- D) Reuptaking acetylcholine into the presynaptic neuron

19. Which structure connects the two hemispheres of the human brain and allows for interhemispheric communication?

- A) Internal capsule
- B) Corpus callosum
- C) Fornix
- D) Cerebellar peduncle

20. In the visual system, which cells are responsible for lateral inhibition in the retina?

- A) Ganglion cells
- B) Bipolar cells
- C) Horizontal cells
- D) Photoreceptors

21. Which part of the neuron is primarily specialized for receiving incoming signals?

- A) Axon hillock
- B) Dendrite
- C) Axon terminal
- D) Myelin sheath

22. The 'all-or-none' principle in neurophysiology refers to the threshold behavior of which phenomenon?

- A) Synaptic potential
- B) Action potential
- C) Graded potential
- D) Membrane permeability

23. Which amino acid is the primary precursor for the synthesis of catecholamines like dopamine and norepinephrine?

- A) Tyrosine
- B) Tryptophan
- C) Glycine
- D) Alanine

24. What is the term for the specific voltage at which a neuron fires an action potential?

- A) Resting potential
- B) Equilibrium potential
- C) Threshold potential
- D) Hyperpolarization

25. Which meningeal layer is the innermost, closest to the surface of the brain?

- A) Dura mater
- B) Arachnoid mater
- C) Pia mater
- D) Subdural space