

Neurobiological Foundations of Psychology

Biological Psychology · Answer Key · 15 Questions

1. Which specific hypothalamic nucleus is primarily responsible for the regulation of circadian rhythms in response to light signals from the retina?

- A) Ventromedial nucleus
- B) Suprachiasmatic nucleus**
- C) Arcuate nucleus
- D) Paraventricular nucleus

2. What is the primary excitatory neurotransmitter in the mammalian central nervous system that plays a critical role in long-term potentiation and synaptic plasticity?

- A) GABA
- B) Glycine
- C) Glutamate**
- D) Dopamine

3. During REM sleep, which physiological phenomenon is specifically associated with the loss of skeletal muscle tone known as atonia?

- A) Inhibition of motor neurons via glycine release in the spinal cord**
- B) Depletion of acetylcholine in the neuromuscular junction
- C) Increased sympathetic nervous system activity
- D) Rapid desynchronization of the thalamocortical loop

4. Which brain structure is structurally characterized by the presence of Purkinje cells and is essential for the timing of motor learning and cognitive sequencing?

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

5. The HPA axis, fundamental to the stress response, culminates in the secretion of which hormone from the adrenal cortex?

- A) Epinephrine
- B) Aldosterone
- C) Cortisol**
- D) Adrenocorticotrophic hormone

6. Which cranial nerve is primarily responsible for the parasympathetic innervation of the viscera, significantly influencing the 'rest and digest' response?

A) Trigeminal nerve

B) Vagus nerve

C) Glossopharyngeal nerve

D) Accessory nerve

7. In neuroanatomy, the 'Broca's area'--associated with motor speech production--is typically located in which specific gyrus of the frontal lobe?

A) Superior frontal gyrus

B) Middle frontal gyrus

C) Inferior frontal gyrus

D) Precentral gyrus

8. Which protein is the primary constituent of the neurofibrillary tangles found in the neurons of patients with Alzheimer's disease?

A) Amyloid-beta

B) Tau protein

C) Alpha-synuclein

D) Prion protein

9. The primary somatosensory cortex is situated in which specific brain region?

A) Precentral gyrus

B) Postcentral gyrus

C) Superior temporal gyrus

D) Occipital lobe

10. Which neurotransmitter deficiency is the pathological hallmark of the degeneration of the substantia nigra pars compacta in Parkinson's disease?

A) Serotonin

B) Norepinephrine

C) Dopamine

D) Acetylcholine

11. What is the effect of the myelination of axons by oligodendrocytes on the conduction velocity of action potentials?

A) It decreases conduction velocity due to increased resistance

B) It has no effect on conduction velocity

C) It increases conduction velocity through saltatory conduction

D) It slows down conduction to prevent neurotransmitter depletion

12. Which visual pathway is primarily responsible for processing spatial location and motion, often referred to as the 'where' pathway?

A) Ventral stream

B) Dorsal stream

C) Retinohypothalamic tract

D) Tectopulvinar pathway

13. The release of which hormone from the posterior pituitary gland is most closely associated with social bonding and trust modulation in human subjects?

A) Vasopressin

B) Oxytocin

C) Prolactin

D) Thyroxine

14. Which specific type of glial cell is responsible for the formation and maintenance of the blood-brain barrier?

A) Microglia

B) Oligodendrocytes

C) Astrocytes

D) Ependymal cells

15. What is the primary function of the corpus callosum in the human brain?

A) Filtering sensory input to the thalamus

B) Facilitating interhemispheric communication

C) Regulating body temperature

D) Coordinating autonomic nervous system reflexes