

PSYCH 260-BBH 203 Exam 2

March 15, 2016

Answer the questions using the Scantron form.

Name: _____

1 Main

Please put in their proper order the steps that lead to synaptic communication between neurons. Begin with the presynaptic cell.

1. Step 1

- A. Voltage-gated Ca^{++} channels open.
- B. Action potential propagates down the axon to the axon terminal.**
- C. Ca^{++} entry initiates exocytosis of neurotransmitter.
- D. Ligand-gated receptors bind neurotransmitter and activate channels in the postsynaptic cell.
- E. Neurotransmitter diffuses across the synaptic cleft.

2. Step 2

- A. Voltage-gated Ca^{++} channels open.**
- B. Action potential propagates down the axon to the axon terminal.
- C. Ca^{++} initiates exocytosis of neurotransmitter.
- D. Ligand-gated receptors bind neurotransmitter and activate channels in the postsynaptic cell.
- E. Neurotransmitter diffuses across synaptic cleft.

3. Step 3

- A. Voltage-gated Ca^{++} channels open.
- B. Action potential propagates down the axon to the axon terminal.
- C. Ca^{++} initiates exocytosis of neurotransmitter.**
- D. Ligand-gated receptors bind neurotransmitter and activate channels in the postsynaptic cell.
- E. Neurotransmitter diffuses across synaptic cleft.

4. Step 4

- A. Voltage-gated Ca^{++} channels open.
- B. Action potential propagates down the axon to the axon terminal.
- C. Ca^{++} initiates exocytosis of neurotransmitter.
- D. Ligand-gated receptors bind neurotransmitter and activate channels in the postsynaptic cell.
- E. Neurotransmitter diffuses across synaptic cleft.**

5. Step 5

- A. Voltage-gated Ca^{++} channels open.
- B. Action potential propagates down the axon to the axon terminal.
- C. Ca^{++} initiates exocytosis of neurotransmitter.
- D. Ligand-gated receptors bind neurotransmitter and activate channels in the postsynaptic cell.**
- E. Neurotransmitter diffuses across synaptic cleft.

Answer the following questions.

6. One theory suggests that the evolution of _____ helped drive the emergence of complex animal forms during the Cambrian explosion.
- A. Visual perception.**
 - B. Physiological mechanisms for passive feeding.
 - C. Radially symmetric bodies and nervous systems.
 - D. Plants.
7. All of the following "nodes" are part of the Swanson/Cajal Four Systems framework *except*.
- A. Sensory
 - B. Motor
 - C. Cognition
 - D. Reproduction**
8. All of the following are components of the SAM axis, EXCEPT:
- A. Midbrain.**
 - B. Sympathetic nervous system.
 - C. Adrenal medulla.
 - D. Hypothalamus.

Match the hormone to its function.

9. Oxytocin
- A. stress response; increases blood glucose; anti-inflammatory effect.
 - B. uterine contraction; milk release; bonding.**
 - C. regulates seasonal changes; sexual maturation.
 - D. blood vessel constriction; antidiuretic hormone.
10. Cortisol
- A. stress response; increases blood glucose; anti-inflammatory effect.**
 - B. uterine contraction; milk release; bonding.
 - C. regulates seasonal changes; sexual maturation.
 - D. blood vessel constriction; antidiuretic hormone.
11. Melatonin
- A. stress response; increases blood glucose; anti-inflammatory effect.
 - B. uterine contraction; milk release; bonding.
 - C. regulates seasonal changes, circadian rhythm; sexual maturation.**
 - D. blood vessel constriction; antidiuretic hormone.

Answer the following questions.

12. Botulinum toxin (botox) blocks the release of acetylcholine from presynaptic terminals. In large quantities, this can be _____ because it _____.
- A. good; speeds the conduction of action potentials.
 - B. bad; blocks communication to muscle fibers.**
 - C. good; accelerates K⁺ flow.
 - D. bad; affects the size and number of presynaptic IPSPs.
13. _____ is a kind of _____ brain imaging method used to study axon fiber (white matter) tracts.
- A. Structural MRI; structural.
 - B. Positron Emission Tomography (PET); functional.
 - C. Magnetoencephalography; functional.
 - D. diffusion tensor imaging (DTI); structural.**
14. AChE contributes to the _____ of _____.
- A. Breakdown and inactivation; acetylcholine.
 - B. Breakdown and inactivation; dopamine, norepinephrine, and epinephrine.**
 - C. Postsynaptic reuptake; serotonin.
 - D. Increase in monoamine levels; GABA-releasing neurons.
15. This neurotransmitter is released by motor neurons onto skeletal muscle.
- A. GABA
 - B. Serotonin
 - C. Acetylcholine**
 - D. Glutamate
16. Selective reuptake inhibitors like Prozac act on _____, _____ the normal process of inactivation.
- A. synaptic vesicles; slowing.
 - B. postsynaptic receptors; accelerating.
 - C. presynaptic transporters; slowing.**
 - D. Na⁺/K⁺ pumps; accelerating.
17. The _____ is one of the places in the adult mammalian brain where new neurons are produced.
- A. region surrounding the cerebral ventricles.**
 - B. thalamus.
 - C. cerebellum.
 - D. ventral spinal cord.

18. The meso-limbo-cortical projection from the _____ in the midbrain releases the neurotransmitter _____. It is part of the brain's 'reward' circuit.
- A. ventral tegmental area; dopamine.**
 - B. raphe nucleus; NE.
 - C. superior colliculus; glutamate.
 - D. thalamus; GABA.
19. The 10th cranial (Xth) or vagus nerve connects to the _____ branch of the autonomic nervous system. Its neurons tend to slow heart rate when stimulated.
- A. sympathetic.
 - B. enteric.
 - C. parasympathetic.**
 - D. somatic.
20. This glial cell type contributes to the 'pruning' of dendritic spines from unused synapses in the CNS.
- A. Pyramidal cells.
 - B. microglia.**
 - C. Schwann cells.
 - D. Stellate cells.
21. _____ receptors contain their own ion channel; _____ do not.
- A. ionotropic; metabotropic.**
 - B. metabotropic; ionotropic.
 - C. GABA; glutamate.
 - D. Dopamine; serotonin.
22. _____ is the primary *excitatory* neurotransmitter in the CNS; _____ is the primary neurotransmitter of *CNS output*.
- A. GABA; glutamate.
 - B. glutamate; GABA.
 - C. glutamate; acetylcholine.**
 - D. Acetylcholine; glutamate.
23. Hormonal action _____ than neuronal action.
- A. is faster-acting.
 - B. is more specific in its effects.
 - C. is slower-acting.**
 - D. involves greater voluntary control.
24. Opening a channel permeable to Na⁺ in a neuron at its resting potential would have a/an _____ effect.
- A. excitatory.**
 - B. inhibitory.
 - C. modulatory.
 - D. Ca⁺⁺ activating.

Match the endocrine structure with the function.

25. Hypothalamus

- A. Circadian (day/night) rhythms.
- B. Responds to adrenocorticotropic hormone (ACTH) by releasing cortisol.
- C. Releases NE and epinephrine.
- D. Controls hormone secretions into and by pituitary.**

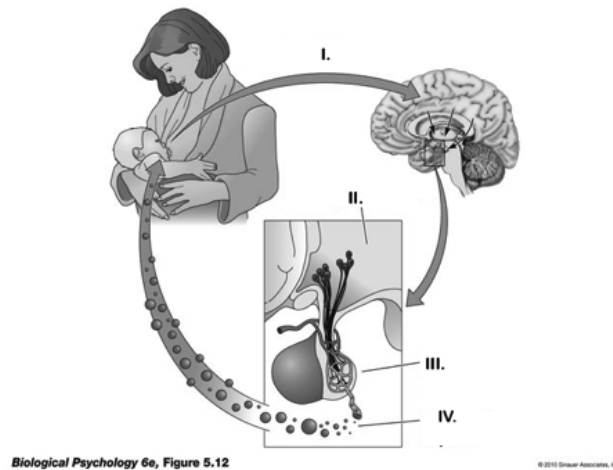
26. Pineal gland

- A. Circadian (day/night) rhythms.**
- B. Responds to adrenocorticotropic hormone (ACTH) by releasing cortisol.
- C. Releases NE and epinephrine.
- D. Controls hormone secretions into and by pituitary.

27. Adrenal cortex

- A. Circadian (day/night) rhythms.
- B. Responds to adrenocorticotropic hormone (ACTH) by releasing cortisol.**
- C. Releases NE and epinephrine.
- D. Controls hormone secretions into and by pituitary.

Match the Roman numeral in the figure below, to the processes and structures in the hormonal action cycle the figure depicts.



28. I

- A. Posterior pituitary.
- B. Nerve impulses to hypothalamus.**
- C. Release of oxytocin.
- D. Hypothalamus.

29. II

- A. Posterior pituitary.
- B. Nerve impulses to hypothalamus.
- C. Release of oxytocin.
- D. Hypothalamus.**

30. III

- A. Posterior pituitary.**
- B. Nerve impulses to hypothalamus.
- C. Release of oxytocin.
- D. Hypothalamus.

31. IV

- A. Posterior pituitary.
- B. Nerve impulses to hypothalamus.
- C. Release of oxytocin.**
- D. Hypothalamus.

32. Dopamine antagonists alleviate some of schizophrenia's positive symptoms – 'additions' to behavior. This _____ the _____ hypothesis of schizophrenia which posits that excessive dopamine causes psychotic symptoms.
- A. Supports; dopamine.**
 - B. Supports; amino acid.
 - C. Undermines; dopamine.
 - D. Undermines; monoamine.
33. Which neurotransmitter/hormone is involved in sexual arousal, childbirth, and social bonding?
- A. Serotonin.
 - B. Oxytocin.**
 - C. Epinephrine.
 - D. Vasopressin.
34. Which of these is NOT one of features of the human brain that contributes to our greater processing capacity?
- A. Dense interconnections.
 - B. High levels of myelination.
 - C. Larger mass but fewer folds.**
 - D. Large cerebral cortex.
35. Synaptogenesis _____; myelination _____.
- A. Continues long after birth; also continues long after birth.**
 - B. Continues long after birth; stops before birth.
 - C. Ends before birth; continues long after birth.
 - D. Ends before birth; also ends before birth.
36. Across the animal kingdom, bigger animals generally have _____ brains.
- A. bigger.**
 - B. smaller.
 - C. smooother, less wrinkled.
 - D. radially symmetric.
37. The human _____ is/are disproportionately large in comparison to other primates.
- A. cerebellum.
 - B. spinal cord.
 - C. cerebral ventricles.
 - D. cerebral cortex.**
38. Histamine is one of the _____ group of neurotransmitters. It is released by the _____.
- A. monoamine; hippocampus.
 - B. amino acid; midbrain.
 - C. monoamine; hypothalamus.**
 - D. peptide; amygdala.

39. Gap junctions support _____ between cells.
- A. direct electrical coupling**
 - B. chemical communication
 - C. slow communication
 - D. hormonal signaling
40. The release of glutamate onto an AMPA receptor on a neuron's dendrite produces an _____.
- A. inhibitory postsynaptic potential (IPSP)
 - B. electrochemical postsynaptic potential (EPSP)
 - C. excitatory postsynaptic potential (EPSP)**
 - D. inwardly-driven postsynaptic potential (IPSP)

Turn to the next page to complete the bonus questions.

2 Bonus

41. The 'birth' of the nervous system occurs at about 18 days post-fertilization when _____ begins.
- A. neurulation.**
 - B. synaptogenesis.
 - C. myelination.
 - D. neuronal migration.
 - E. cortical folding.
42. During human brain development, the process of *apoptosis* describes:
- A. Expansive myelination in the CNS.
 - B. Movement of newly development cells to their proper locations.
 - C. Stem cells become specified types of cells.
 - D. Pruning of neurons via cell death.**
43. The longitudinal fissure divides the _____.
- A. left hemisphere from the right.**
 - B. temporal lobe from the frontal and parietal lobes.
 - C. frontal lobe from the parietal lobes.
 - D. corpus callosum from the anterior commissure.
44. Spina bifida results from _____.
- A. malformation of the brain.
 - B. failure to myelinate peripheral neurons.
 - C. failure of caudal neural tube closure.**
 - D. slow rates of neurogenesis.