

PSYCH 260H Exam 2

October 13, 2017

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

Answer the following questions.

6. If a neurotransmitter causes a postsynaptic terminal to *open* a K^+ channel, thus increasing the outward flow of this ion, the result will be an _____.
- A. excitatory pre-synaptic potential
 - B. inhibitory post-synaptic potential**
 - C. enhanced peri-synaptic potential
 - D. intrinsic pre-synaptic potential
7. The brain's response to threatening or challenging situations involves both a/an _____ component (via the release of corticosteroids) and a/an _____ component (via the sympathetic nervous system).
- A. endocrine; neural**
 - B. dopamine; serotonin
 - C. glutamate; GABA
 - D. monoamine; amino acid

Match the hormone to its function.

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

Answer the following questions.

10. Botulinum toxin (botox) blocks the release of acetylcholine (ACh) 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.
11. _____ 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.**
12. The enzyme 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.
13. This neurotransmitter is released by motor neurons onto skeletal muscle.
- A. GABA
 - B. Serotonin
 - C. Acetylcholine**
 - D. Glutamate
14. 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.
15. The meso-limbic-cortical projection from the _____ in the midbrain releases the neurotransmitter _____.
- A. ventral tegmental area; dopamine.**
 - B. raphe nucleus; NE.
 - C. superior colliculus; glutamate.
 - D. thalamus; GABA.

16. The lateral 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.
17. This small 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.
18. _____ receptors do *not* contain their own ion channel.
A. ionotropic
B. metabotropic
C. ligand-gated
D. voltage-gated
19. _____ 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.
20. 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.
21. 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.

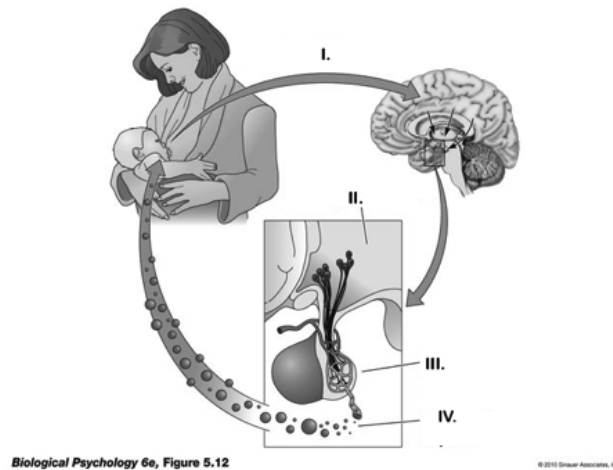
22. Hypothalamus

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

23. Adrenal cortex

- A. Influences circadian rhythms by releasing melatonin.
- B. Releases cortisol.**
- C. Releases 5-HT, 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.



24. I

- A. Nerve impulses activate temporal lobe neurons.
- B. Nerve impulses activate the hypothalamus.**
- C. Nerve impulses activate the anterior pituitary.
- D. Somatosensory cortex activates the thalamus.

25. II

- A. Posterior pituitary.
- B. Hippocampus.
- C. Anterior pituitary.
- D. Hypothalamus.**

26. III

- A. Posterior pituitary.**
- B. Anterior pituitary.
- C. Pineal gland.
- D. Hypothalamus.

27. IV

- A. Release of GnRH into blood stream.
- B. Release of melatonin into blood stream.
- C. Release of oxytocin into blood stream.**
- D. Release of cortisol into blood stream.

Answer the following questions.

28. Both Parkinson's Disease and schizophrenia have been linked to disturbances in _____ neurotransmitter systems.
- A. dopamine.**
 - B. GABA.
 - C. acetylcholine.
 - D. serotonin.
29. The human neural tube begins to form at about _____ weeks of gestation, eventually becoming the _____.
- A. 13; peripheral nervous system
 - B. 40; autonomic nervous system
 - C. 3; cerebral ventricles & central canal of the spinal cord**
 - D. 1; cerebral aqueduct of the midbrain
30. The release of the circadian-rhythm-regulating hormone _____ from the _____ is controlled by a sympathetic nervous system neuron which releases _____ as a neurotransmitter.
- A. melatonin; pineal gland; norepinephrine**
 - B. melanin; posterior pituitary; GABA
 - C. vasopressin; anterior pituitary; dopamine
 - D. norepinephrine; adrenal cortex; serotonin
31. A chemical released by one neuron onto another neuron is called a _____ while one released by a neuron into the bloodstream is called a _____.
- A. tropic hormone; releasing hormone
 - B. reuptake inhibitor; endocrine enhancer
 - C. neurotransmitter; hormone**
 - D. ligand-gated channel; voltage-gated channel
32. Specialized molecules embedded in the presynaptic membrane called transporters contribute to the _____ phase of neurotransmitter release.
- A. inactivation**
 - B. action potential
 - C. voltage-gated Ca^{++} exit
 - D. second messenger signaling
33. One feature of the human brain that now appears especially distinctive and important in explaining our cognitive capacity is the _____.
- A. number of neurons in the cerebral cortex**
 - B. number of neurons in the cerebellum
 - C. the size of the cerebellum
 - D. the speed of action potential propagation
34. The first animals with neurons and nervous systems emerged around the time of the _____, about _____ years ago.
- A. "Big Bang"; 13.8 billion
 - B. formation of the Earth; 4.6 billion
 - C. Cambrian Explosion; 540 million**
 - D. end of the last Ice Age; 12,000

35. Cortical areas in humans have maximal *synaptic density* _____.
A. in the 30s and 40s
B. in adolescence
C. prenatally
D. before the age of 5.
36. The formation of synapses (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.
37. Across the animal kingdom, bigger animals generally have _____ brains.
A. bigger.
B. smaller.
C. smooother, less wrinkled.
D. radially symmetric.
38. The vast majority of neurons and glia in the CNS are generated _____ from a set of precursor cells that line the _____.
A. prenatally; neural tube
B. prenatally; synaptic vesicles
C. postnatally; neural tube
D. postnatally; synaptic vesicles
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. inwardly-driven postsynaptic potential (IPSP)
D. excitatory postsynaptic potential (EPSP)

Turn to the next page to complete the bonus questions.

2 Bonus

41. The hippocampus is located deep within which lobe of the cerebral cortex?
- A. Temporal.**
 - B. Frontal.
 - C. Parietal.
 - D. Occipital.
42. All of these brain development processes show patterns of increase and decline in the first several months (or years) of life *except*.
- A. myelination**
 - B. synaptogenesis
 - C. thickness of cerebral cortex
 - D. number of neurons in spinal cord.
43. The 10th cranial (Xth) or vagus nerve connects to the _____ branch of the autonomic nervous system. Its neurons tend to slow heart rate and activate digestion when stimulated.
- A. parasympathetic.**
 - B. sympathetic.
 - C. enteric.
 - D. somatic.
44. Corticotropin Releasing Hormone (CRH) is released by the _____ into the _____.
- A. hippocampus; amygdala.
 - B. adrenal cortex; blood stream.
 - C. hypothalamus; anterior pituitary.**
 - D. medulla oblongata; adrenal medulla.