

Part A

Multiple Choice (20 points) – circle the letter of the correct answer

1. The speed with which the largest-diameter (20 mm) myelinated axons in mammals conduct action potentials is:
 - a. 120 mm/s.
 - b. 120 m/s.
 - c. 1 m/s.
 - d. 100 m/s.
2. An afterpotential is:
 - a. A brief hyperpolarization that follows an action potential (“undershoot”).
 - b. A brief depolarization that follows an action potential (“overshoot”).
 - c. A brief hyperpolarization that follows an EPSP (“undershoot”).
 - d. The portion of an action potential between 0 and +30 mV.
3. The absolute refractory period refers to the brief period of time:
 - a. During which a postsynaptic receptor cannot bind another neurotransmitter after it has been open.
 - b. After a neuron has fired an action potential, during which the same neuron cannot fire another action potential.
 - c. After exocytosis and before the release of more neurotransmitter from the presynaptic neuron.
 - d. All of the above.
4. Which plane divides the brain from front to back (parallel to the face)?
 - a. Sagittal.
 - b. Frontal.
 - c. Coronal.
 - d. Horizontal.
5. The brain and spinal cord are wrapped in protective membranes known collectively as the:
 - a. Dura mater.
 - b. Pia mater.
 - c. Myelin.
 - d. Meninges.
6. Not a part of the cytoskeleton:
 - a. Microfilaments (Actin).
 - b. Golgi apparatus.
 - c. Microtubules.
 - d. Intermediate filaments.

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7. Not a part of the Astrocytes' functions:
 - a. Myelination of axons.
 - b. Structural and nutritional support for neurons.
 - c. Isolation of the synapse.
 - d. Blood brain barrier.
8. The term metabotropic refers to:
 - a. Electrical synapses.
 - b. Fast synapses.
 - c. Ligand-gated ion channels.
 - d. Slow synapses.
9. Inhibitory postsynaptic potentials differ from excitatory postsynaptic potentials most significantly in their:
 - a. Direction of membrane polarization.
 - b. Degree of capacitance.
 - c. Ease of elicitation.
 - d. Overall amplitude.
10. Most IPSPs are attributable to the:
 - a. Opening of sodium channels.
 - b. Closing of potassium channels.
 - c. Opening of chloride channels.
 - d. None of the above.
11. Not a part of the Peripheral Nervous System (PNS):
 - a. The autonomic nervous system.
 - b. The spinal cord.
 - c. The cranial nerves.
 - d. The sympathetic nervous system.
12. Which structure does not contain any parts of the reticular formation?
 - a. Tectum.
 - b. Forebrain.
 - c. Hindbrain.
 - d. Medulla.
13. Functionally, cranial nerves carry which kind of information?
 - a. Motor and sensory.
 - b. Motor.
 - c. Sensory.
 - d. None of the above.
14. The sympathetic nervous system stimulates:
 - a. Digestion.
 - b. Penile erection.
 - c. Salivation.
 - d. Faster heartbeat.

15. Opium contains:
 - a. Morphine.
 - b. Heroin.
 - c. Naloxone.
 - d. All of the above.
16. Why would we want to inhibit neural activity?
 - a. Treatment after synaptogenesis.
 - b. Sharpening focus of perceptions.
 - c. Synchronization of firing.
 - d. b and c.
17. Which technique does not provide information about the *activity* of brain regions?
 - a. PET.
 - b. CT.
 - c. fMRI.
 - d. Autoradiography.
18. The structures of the limbic system are particularly implicated in:
 - a. Emotion and learning.
 - b. Sensation.
 - c. Motor control.
 - d. Sympathetic nervous system control.
19. In most of the population:
 - a. All language properties are lateralized to the left-hemisphere.
 - b. All language properties are lateralized to the right-hemisphere.
 - c. Most language properties are lateralized to the left-hemisphere, prosody and musical perception are lateralized to the right-hemisphere.
 - d. Most language properties are lateralized to the right-hemisphere, prosody and musical perception are lateralized to the left-hemisphere.
20. Not a neuropeptide:
 - a. Vasopressin.
 - b. Cholecystokinin
 - c. Nitric oxide.
 - d. Substance P.



Part B
Short Answer (40 points)

1. The cell organelles in which proteins are synthesized: _____.
2. _____ serve as a bridge between sensory and motor neurons.
3. Nitric oxide performs a type of signaling between neurons and is also involved with the maintenance of _____.
4. Noncompetitive ligands bind to a _____ site on the receptor.
5. Benzodiazepines affect the _____ of channel opening in GABA_A receptors.
6. GABA_A receptor is _____ tropic, producing _____ effects, with a _____ channel, causing _____ polarization.
7. GABA is cleared from the synapse by _____ and by _____.
8. Glycine is an excitatory/inhibitory neurotransmitter (circle the correct answer) found in the spinal cord/brain (circle the correct answer).
9. Curare and _____ are Acetylcholine/ Glutamate (circle the correct answer) agonists/antagonists (circle the correct answer).
10. One brain structure in which Acetylcholine is produced is the _____.
11. Increased intake of foods containing tryptophan increases / decreases (circle the correct answer) Serotonin production.
12. Black widow venom increases / decreases (circle the correct answer) Acetylcholine release.
13. An fMRI image measures neuronal activity directly/indirectly (circle the correct answer).
14. In MRI, the assumption is that different tissues have different _____ times, creating different signals.

15. The _____ is a brainstem area, in which the blood-brain-barrier is more permeable, the area triggers vomiting in response to detection of circulating toxins.
16. The cerebral cortex is a structure located at the Hindbrain/Midbrain/Forebrain (circle the correct answer).
17. _____ area is located near the primary motor cortex in the frontal lobe; it participates in speech production.
18. Parkinson's disease is related to the degeneration of the _____.
19. For an NMDA receptor channel to open, _____ neurotransmitter needs to be present, and the membrane needs to be _____.
20. The enzyme responsible for breaking down molecules of transmitters such as dopamine, norepinephrine, and serotonin is _____.

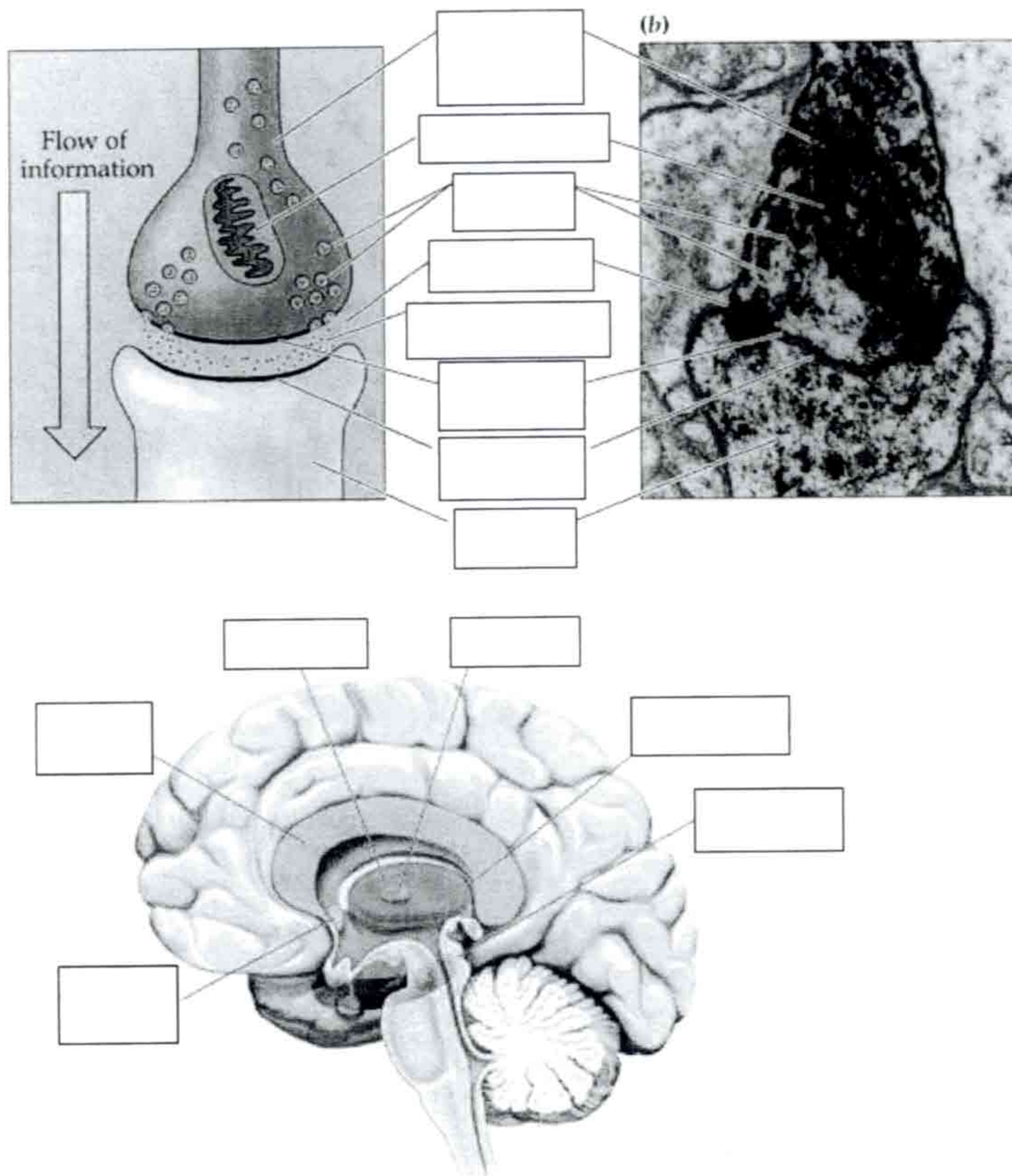
Part C
Essay Questions (25 points) – answer 5 of 8

1. Name 5 different exogenous antagonists and describe their function.
2. What is meant by the method of “cognitive subtraction” in functional neuroimaging research? What problems does this method face?
3. Describe the causes, process and effects of an action potential.
4. Describe the Cholinergic pathways in the brain and their effects.
5. Name and explain three fates that can happen to neurotransmitter after it finishes binding to a receptor.
6. Name 3 different brain imaging techniques and compare their temporal and spatial resolutions. Mention the pros and cons.
7. Name 3 drugs that act on the dopaminergic system and describe their behavioral effects.
8. Define tolerance and withdrawal, and describe two mechanisms leading to them.

(Use this page for Essay answers. Continue on back if required)

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Part D
Labeling (15 points; 1 point for each label)



The plane of section in Figure 2 is _____.

