Human Anatomy & Physiology I
with Dr. Hubley

Practice Exam 3
1. Which one of the following statements is true about BOTH the endocrine and nervous systems?
   a. This system uses chemicals to send signals from one cell to another.
   b. Cells in this system use action potentials to send signals.
   c. Cells in this system release chemicals called hormones.
   d. A signal sent by this system may last in the body for days.
   e. This system includes the spinal cord.

2. Which of the following structures is most directly important for the nervous system’s function of gathering sensory information?
   a. anterior median fissure
   b. central canal
   c. dorsal root
   d. anterior horn
   e. filum terminale

3. Which of the following structures may be involved in sending motor commands?
   a. dorsal root ganglion
   b. bipolar neuron
   c. skeletal muscle
   d. multipolar neuron
   e. posterior median sulcus

4. Which one of the following systems includes all of the others?
   a. autonomic
   b. efferent
   c. sympathetic
   d. somatic
   e. parasympathetic

5. Which of the following systems includes BOTH sensory and motor information?
   a. somatic
   b. autonomic
   c. peripheral
   d. afferent
   e. More than one of the responses above is correct.
6. Which part of a neuron is found inside the soma?
   a. dendrite
   b. Nissl body
   c. telodendrion
   d. axolemma
   e. synaptic knob

7. On which part of a neuron are chemical-gated sodium channels found?
   a. dendrite
   b. Nissl body
   c. telodendrion
   d. axolemma
   e. nucleus

8. A node of Ranvier is found between two
   a. dendrites.
   b. axon terminals.
   c. Schwann cells.
   d. Nissl bodies.
   e. mitochondria.

9. A neuron typically receives signals from other neurons on its
   a. dendrites
   b. soma
   c. synaptic terminals
   d. axolemma
   e. More than one of the responses above is correct.

10. A ___________ neuron has a central process and a peripheral process.
    a. bipolar
    b. multipolar
    c. quadrupolar
    d. unipolar
    e. None of the responses above is correct.
11. In the diagram above, which neuron is the presynaptic cell at synapse #2?

12. In the diagram above, which neuron is the postsynaptic cell at synapse #3?

13. An interneuron typically has ___________ and ___________.
   a. one axon; one dendrite
   b. one central process; one peripheral process
   c. more than one axons; one dendrite
   d. one axon; more than one dendrites
   e. more than one axons; more than one dendrites

14. A neuron that receives signals from neurons and sends its signals to other neurons is
   a. a sensory neuron.
   b. a motor neuron.
   c. an interneuron.
   d. a bipolar neuron.
   e. More than one of the responses above is correct.

15. A skeletal muscle cell will receive signals directly from
   a. a somatic motor neuron.
   b. a visceral motor neuron.
   c. an interneuron.
   d. All of the responses above are correct.
   e. None of the responses above is correct.
16. Suppose that 500 Na$^+$ ions move through a channel from outside a neuron to the inside. This movement of Na$^+$ can be called a
   a. current.
   b. voltage.
   c. resistance.

17. When chemical-gated potassium channels open, the ______________________ decreases.
   a. current of potassium moving across the membrane
   b. voltage across the membrane
   c. resistance of the membrane to potassium
   d. All of the responses above are correct.
   e. None of the responses above is correct.

18. Which channels are most important in determining the resting potential?
   a. open channels for sodium
   b. chemical-gated channels for sodium
   c. voltage-gated channels for potassium
   d. voltage-gated channels for calcium

19. Movement of Na$^+$ through the Na$^+$/K$^+$-ATPase pump is an example of which process?
   a. simple diffusion
   b. facilitated diffusion
   c. active transport
   d. vesicular transport
   e. filtration

20. When a neuron is at its resting potential, opening a channel for K$^+$ results in net movement of K$^+$$
   a. into the cell by facilitated diffusion.
   b. into the cell by active transport.
   c. out of the cell by facilitated diffusion.
   d. out of the cell by active transport.
21. Where are chemical-gated sodium channels located?
   a. in the plasma membrane of the soma
   b. in the plasma membrane of the dendrites
   c. in the axolemma
   d. in the myelin sheath
   e. More than one of the responses above is correct.

22. Consider a neuron at rest: opening chemical-gated potassium channels will cause
   a. hyperpolarization of the neuron.
   b. net movement of positive charge into the neuron.
   c. depolarization of the neuron.
   d. a more positive voltage inside the neuron.
   e. an action potential.

23. When a depolarizing graded potential occurs, the amount of depolarization is determined by
   a. the number of sodium atoms that enter the neuron.
   b. the number of chemical-gated sodium channels that open.
   c. the length of time that chemical-gated sodium channels stay open.
   d. All of the responses above are correct.
   e. None of the responses above is correct.

24. Which one of the following definitions is the best definition of the term “action potential”?
   a. a change in voltage across the plasma membrane.
   b. a local change in voltage across the plasma membrane.
   c. a large change in voltage that spreads across the entire excitable membrane.
   d. a depolarization of the plasma membrane.
   e. a threshold.

25. Which one of the following responses lists the phases of an action potential in the proper order?
   a. depolarizing phase → hyperpolarization → repolarizing phase
   b. depolarizing phase → repolarizing phase → hyperpolarization
   c. hyperpolarization → repolarizing phase → depolarizing phase
   d. repolarizing phase → depolarizing phase → hyperpolarization
   e. repolarizing phase → hyperpolarization → depolarizing phase
For questions 26-28 refer to the following chart, which shows changes in a neuron’s membrane voltage over time. The dashed line indicates the neuron’s threshold voltage. Select response “e” if more than one of the letters “a” through “d” is correct.

![Diagram showing changes in membrane voltage over time.](image)

26. At what point are voltage-gated potassium channels starting to open?

27. At what point are voltage-gated sodium channels starting to close?

28. At which point is the Na⁺/K⁺-ATPase pumping?

29. Which term does not belong with the others?
   a. sodium
   b. excitatory
   c. EPSP
   d. hyperpolarization

30. Which part of a neuron is part of the “conductive segment”?
   a. dendrite
   b. Nissl body
   c. nucleus
   d. axon
   e. More than one of the responses above is correct.
31. Certain cone snails produce venom that contains chemicals that block voltage-gated calcium channels. Imagine this venom is placed on a single neuron. This neuron will be unable to
   a. maintain a resting potential.
   b. have graded potentials.
   c. have an action potential.
   d. release neurotransmitters.
   e. More than one of the responses above is correct.

32. Which one of the following statements is true about the nodes of Ranvier?
   a. Nodes are required to allow sodium to enter myelinated axons.
   b. Nodes are required for continuous conduction.
   c. Nodes prevent the movement of charged particles along an axon.
   d. Nodes are mainly found on dendrites of motor neurons.
   e. Nodes allow facilitated diffusion of potassium into the axon.

33. Once a neuron fires an action potential, there is a period of time before it can fire another action potential. What is the name for this period of time?
   a. the hyperpolarizing period
   b. the refractory period
   c. the propagation period
   d. the resting period

34. Fifty neurons release excitatory neurotransmitters onto the dendrites and body of neuron “A.” Neuron A reaches threshold and fires an action potential. This is an example of
   a. temporal summation.
   b. relative summation.
   c. saltatory summation.
   d. spatial summation.
   e. continuous summation.

35. Imagine that the neurotransmitter acetylcholine excites neuron A. Also imagine that half of the enzyme acetylcholinesterase at neuron A’s synapses has just been blocked. Which of the following statements is true about neuron A?
   a. Neuron A is now more likely to fire an action potential.
   b. Neuron A is now less likely to fire an action potential.
   c. Neuron A now cannot fire any action potentials.
36. Which of the following terms or phrases does not belong with the others?
   a. potassium
   b. excitatory
   c. hyperpolarizing
   d. IPSP

37. Neurotransmitters are released into a synapse by the process of
   a. facilitated diffusion
   b. active transport
   c. exocytosis
   d. filtration
   e. simple diffusion

38. In order to conduct a spinal tap to remove CSF from outside a person’s spinal cord, through which membranes must you pass a needle?
   a. dura mater only
   b. dura mater and pia mater only
   c. dura mater and arachnoid only
   d. pia mater and arachnoid only
   e. dura mater, pia mater, and arachnoid

39. Which structure is the most inferior?
   a. spinal cord
   b. conus medullaris
   c. lumbar enlargement
   d. cauda equina
   e. cervical enlargement

40. Information traveling up the spinal cord is
   a. sensory.
   b. motor.
   c. sensory and motor.
41. Which one of the spinal meninges is located closest to the white matter of the spinal cord?
   a. arachnoid
   b. epidural space
   c. dura mater
   d. pia mater

42. Each nerve fascicle is wrapped directly in a layer of connective tissue called the
   a. axolemma.
   b. epineurium.
   c. neurilemma.
   d. perineurium.
   e. endoneurium.

43. A group of neuron bodies in the anterior horn of the spinal cord can be called a
   a. tract.
   b. ganglion.
   c. nucleus.
   d. root.
   e. nerve.

44. From which plexus does the phrenic nerve arise?
   a. cervical
   b. brachial
   c. lumbar
   d. sacral
   e. More than one of the responses above is correct.

45. Which nerve plexus includes the ventral rami from spinal nerves L1 to L4?
   a. cervical
   b. brachial
   c. lumbar
   d. sacral
   e. coccygeal
For questions 46 through 50 refer to the diagram below. Answer each question with one of the letters from the diagram.

Select the letter "e" if more than one of the letters (a-d) is correct answers!

46. Which letter indicates a dorsal root?

47. Which letter indicates an anterior horn?

48. Which letter indicates a structure that contains axons of motor neurons?

49. Which letter indicates the spinal nerve?

50. Which letter indicates a structure that carries only sensory information?