OBJECTIVES

After studying this chapter, you should be able to:

1. Name the major subdivisions of the nervous system.
2. Classify the different types of neuroglia cells.
3. List the structural and functional classification of neurons.
4. Explain how a neuron transmits a nerve impulse.
5. Name the different types of neural tissues and their definitions.
6. Describe the structure of the spinal cord.
7. Name and number the spinal nerves.

ACTIVITIES

A. Completion

Fill in the blank spaces with the correct term.

1. Being a(n) ___ center and a(n) ___ network is a function of the nervous system.
2. The control center for the entire system is the ___ ___ ___.
3. The sensory system, also named the ___ ___ ___, is a subdivision of the ___ ___ ___.
4. Motor neurons are part of the ___ ___ ___.
5. The speeding up of activity is a function of the ___ portion of the ANS.

NAME: ___________________________________ DATE: ____________

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6. ___ slows down the system, whereas ___ speeds it up.
7. A nerve is a bundle of ___.
8. The nerve glue is the ___ cell.
9. ___ cells form myelin sheaths around nerve fibers.
10. The star-shaped ___ prevents toxic substances from entering the brain.
11. Protein synthesis occurs in the ___ ___ also called ___ ___.
12. The branches of trees on the nerve cell are the ___.
13. Peripheral axons are enclosed in fatty ___ sheaths.
14. Most neurons of the brain are ___.
15. Myelin gaps are called ___.
16. The transmission of impulses is handled by the ___ neurons.
17. The efferent neurons are multipolar; the afferent neurons are ___.
18. The act of salivating would be caused by a(n) ___ neuron.
19. The three types of ions involved in nerve impulses are ___, ___, and ___.
20. Reversal of electrical charge is ___.
21. When the outside of a nerve is positively charged and the inside is negatively charged, the condition is known as the ___ ___.
22. The nerve impulse is a self-propagating wave of ___.
23. The gap between the axon of one nerve and the dendrite of another is referred to as the ___.
24. The impulse is carried across the gap by ___.
25. An involuntary reaction to an external stimulus is called a(n) ___.
26. The gray matter on the brain's surface is known as the ___.
27. The spider layer of the meninges is the ___ ___.
28. The sensory root of the spinal cord is the ___ ___.
29. There are ___ pairs of cervical nerves.
30. External stimuli affect ___ neurons.
31. One example of a(n) ___ is Valium.
32. Taken in large doses, anabolic steroids have a(n) ___ feedback effect on the hypothalamus.
33. The transparent fibrous membrane that forms a tube around the spinal cord is the ___ ___.

B. Matching

Match the term on the right with the definition on the left.

___ 34. control center a. reflex
___ 35. motor neuron b. adrenaline
___ 36. sensory neurons c. pia mater
___ 37. majority of brain cells d. neurofibril nodes
___ 38. neurons with multiple dendrites e. synapse
___ 39. neurolemmocytes f. cervical nerves
C. Key Terms

Use the text to look up the following terms. Write the definition or explanation.

54. Acetylcholine:

55. All-or-none law:

56. Autonomic nervous system:

57. Axon terminals:

58. Bipolar neurons:

59. Chromatophilic substance or Nissl bodies:
60. Cortex:

61. Depolarization:

62. Dopamine:

63. Dura mater:

64. Ependymal cells:

65. Ganglia:

66. Membrane or resting potential:

67. Myelin sheath:

68. Nerve:

69. Nodes of Ranvier/neurofibril nodes:

70. Oligodendroglia:
71. Posterior or dorsal gray horn:

72. Reflex:

73. Repolarization:

74. Schwann cells/neurolemmocytes:

75. Serotonin:

76. Somatic nervous system:

77. Spinal meninges:

78. Unipolar neurons:

79. Ventral root:
D. Labeling Exercise

80. Label the nerve cells as indicated in Figure 10-1.

Figure 10-1

A. ___________________________
B. ___________________________
C. ___________________________
D. ___________________________
E. ___________________________
81. Label the parts of the neuron as indicated in Figure 10-2.

A. 

B. 

C. 

D. 

E. 

Figure 10-2
E. Coloring Exercise

82. Using Figure 10-3, color the cervical spinal nerves red, the thoracic spinal nerves green, the lumbar spinal nerves yellow, and the sacral spinal nerves blue.
F. Critical Thinking

Answer the following questions in complete sentences.

83. Explain how the sympathetic and parasympathetic systems work during a “fight-or-flight” experience.

84. Why is an efferent neuron multipolar?

85. Why do myelin-covered neurons carry an action potential faster than an uncovered neuron?

86. Why doesn’t acetylcholine remain on the postsynaptic neuron?

87. Using the five components of the reflex arc, explain the body’s reaction to a hand on a hot surface.

88. How does the reflex action help maintain homeostasis?
G. Crossword Puzzle

Complete the crossword puzzle using the following clues.

ACROSS
1. Sympathetic neurotransmitter
3. Nerve cell groups
4. Neurons that have several dendrites and one axon
9. Creates action potential
11. Receive stimuli
13. Long extension of a nerve cell body
15. Recharge nerves
16. Protective membrane
17. Bundle inside the CNS
18. One axon, one dendrite
20. Cells that support and protect
21. Gray matter in spinal cord
23. Resting potential
24. Star shaped
26. Afferent neuron
27. Uppers
28. Nerve cells
29. Cells with only one process

DOWN
2. Semirigid rows
5. Line brain ventricles
6. Spider layer
7. Downer
8. Motor neuron
10. Association neuron
12. Serotonin, endorphins
14. Parasympathetic neurotransmitter
19. Bundle of nerve cells
22. Kind of cells that form myelin sheaths
23. Do phagocytosis
25. Gap between neurons

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Lalia Escobar, a 20 year-old pre-medical student, is scheduled to undergo a spinal tap this morning for diagnostic purposes. Lalia has been instructed about the procedure by her health care providers. Lalia learns that cerebrospinal fluid will be extracted during the spinal tap, and sent to the laboratory for analysis.

QUESTIONS

1. When performing a spinal tap, where must the needle be inserted in order to avoid damage to the spinal cord?

2. What can health care providers learn from analysis of a patient's cerebrospinal fluid?

3. In addition to analyzing cerebrospinal fluid, what are other purposes for a spinal tap?

CHAPTER QUIZ

1. The nervous system shares in the maintenance of homeostasis with which system?
   a. respiratory
   b. endocrine
   c. skeletal
   d. digestive
   e. muscular
   Answer:

2. The system that conducts impulses from the brain and spinal cord to skeletal muscles is the
   a. parasympathetic
   b. sympathetic
   c. autonomic
   d. somatic
   e. afferent
   Answer:

3. The “glue” cells that perform the function of support and protection are
   a. neurons
   b. astrocytes
   c. neuroglia
   d. ependymal
   e. Schwann
   Answer:

4. Oligodendroglia are found in the
   a. brain and spinal cord
   b. heart
   c. fingers
   d. muscles
   e. lungs
   Answer:
5. Phagocytosis is performed by
   a. astrocytes
d   b. oligodendroglia
c   c. microglia
d   e. ependymal cells
e   Schwann cells

   Answer:

6. The cells that make up the myelin sheath are
   a. astrocytes
d   b. oligodendroglia
c   microglia
d   ependymal cells
e   Schwann cells

   Answer:

7. The cells that line the cavities in brain and spinal cord are
   a. astrocytes
d   b. oligodendroglia
c   microglia
d   ependymal cells
e   Schwann cells

   Answer:

8. Nissl bodies are attached to
   a. mitochondria
d   endoplasmic reticulum
c   lysosome
e   Golgi bodies
f   neurofibrils

   Answer:

9. Neurolemmocytes are also known as
   a. astrocytes
d   ependymal cells
e   Schwann cells
   b. oligodendroglia
c   microglia

   Answer:

10. A neuron with one axon and one dendrite is known as
    a. unipolar
d   b. bipolar
e   terminal
c   afferent

    Answer:

11. Receptors are
    a. afferent neurons
d   e. internuncial neurons
    b. efferent neurons
e   association neurons
c   multipolar neurons

    Answer:

12. Reaction neurons are
    a. afferent neurons
d   e. internuncial neurons
    b. efferent neurons
e   unipolar neurons
c   association neurons

    Answer:

13. The sodium pump is used to maintain the
    a. action potential
d   d. depolarization
    b. electrical potential
e   repolarization
c   membrane

    Answer:
14. Which of the following is NOT a neurotransmitter?
   a. acetylcholine  
   b. norepinephrine  
   c. serotonin  
   d. dopamine  
   e. none of above

   Answer:

15. The smallest, simplest pathway to receive and process a stimulus is the
   a. reflex  
   b. CNS  
   c. ANS  
   d. neuroglia  
   e. none of above

   Answer:

16. Some of the most commonly abused drugs are
   a. steroids  
   b. depressants  
   c. stimulants  
   d. hallucinogens  
   e. all of above

   Answer:

17. Ganglia are found
   a. in the brain  
   b. in the cortex  
   c. in a tract  
   d. outside the brain  
   e. none of above

   Answer:

18. Gray matter is found in the
   a. cortex  
   b. myelin  
   c. neuroglia  
   d. nerve tracts  
   e. none of above

   Answer:

19. The tough mother is the
   a. pia mater  
   b. dura mater  
   c. spider layer  
   d. arachnoid mater  
   e. posterior root

   Answer:

20. The layer containing numerous blood vessels and nerves is the
   a. pia mater  
   b. spider layer  
   c. dura mater  
   d. arachnoid mater  
   e. subdural space

   Answer:

21. The spider layer is the
   a. pia mater  
   b. dura mater  
   c. subdural space  
   d. arachnoid mater  
   e. epidural space

   Answer:
22. Serous fluid is found in the
   a. pia mater  
   b. dura mater  
   c. arachnoid mater  
   d. subdural space  
   e. epidural space

   **Answer:**

23. Spinal taps are done in which region of the spine?
   a. cervical  
   b. thoracic  
   c. lumbar  
   d. sacral  
   e. coccyx

   **Answer:**

24. Meninges are separated from the vertebrae by the
   a. subdural space  
   b. spider layer  
   c. epidural space  
   d. pia mater  
   e. subarachnoid space

   **Answer:**

25. The functions of the spinal cord include
   a. reflex/respiration  
   b. reflex/emotion  
   c. reflex/cogitation  
   d. reflex/conveyance  
   e. reflex/protection

   **Answer:**

26. The enzyme that breaks down acetylcholine is
   a. an anabolic steroid  
   b. sodium  
   c. acetylcholinesterase  
   d. dopamine  
   e. serotonin

   **Answer:**

27. Heartbeat rate, digestion, and breathing rates are controlled and maintained by reflexes concerned with ____ processes.
   a. respiratory  
   b. involuntary  
   c. cognitive  
   d. cortical  
   e. somatic

   **Answer:**

28. How many pairs of spinal nerves are there?
   a. 5  
   b. 12  
   c. 23  
   d. 31  
   e. 40

   **Answer:**