The Nervous System: The Brain, Cranial Nerves, Autonomic Nervous System, and the Special Senses

OBJECTIVES

After studying this chapter, you should be able to:

1. List the principal parts of the brain.
2. Name the functions of the cerebrospinal fluid.
3. List the principal functions of the major parts of the brain.
4. List the 12 cranial nerves and their functions.
5. Name the parts of the autonomic nervous system and describe how it functions.
6. Describe the basic anatomy of the sense organs and explain how they function.

ACTIVITIES

A. Completion

Fill in the blank spaces with the correct term.

1. The brain is protected by the __ __ and the __ __.
2. The brain weighs __ __.
3. The three cranial meninges are the __ __ mater, the __ __ mater, and the __ __ mater.

NAME: ____________________________ DATE: ________________

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4. The bridge of nerve fibers connecting the two sides of the brain is the ____ ____.
5. The third and fourth ventricles are connected by the ____ ____.
6. The area contained within the medulla having dispersed gray matter is the ____ ____.
7. The midbrain contains the ____ ____.
8. The diencephalon is divided into the ____ and the ____.
9. The optic tracts and optic chiasma are within the ____.
10. The mammillary bodies are involved in ____ and ____.
11. The superior part of the diencephalon that plays a role in conscious recognition of pain is the ____.
12. The surface of the cerebrum made up of gray matter is known as the ____ ____.
13. The right and left hemispheres of the brain are separated by the ____ ____.
14. The ____ lobe is behind the frontal lobe.
15. Deep within the lateral sulcus is the ____.
16. The second largest portion of the brain is the ____.
17. The autonomic nervous system, a subdivision of the peripheral nervous system, has two parts; they are the ____ and the ____.
18. There are ____ pairs of cranial nerves.
19. The sense of smell is the ____ sense.
20. In the cilia that detect odors are ____.
21. The ____ ____ actually function as the receptors of the taste cells.
22. There are four major taste sensations; they are ____, ____ , ____ , and ____.
23. The black layer of the eye, which absorbs light, is the ____.
24. The portion of the eye that regulates the amount of light that enters the eye is the ____.
25. The area producing the sharpest vision is the ____ ____.
26. The two openings on the medial side of the middle ear are ____ and the ____.
27. The vestibule and the semicircular canals are involved in ____.
28. Inflammation of brain tissue is called ____.
29. ____ is characterized by tremors of the hand.
30. Brain damage during brain development or the birth process can result in ____ ____.
31. ____ can be corrected by the use of reading glasses.
32. ____ ____ is caused by a stimulation of the semicircular canals of the inner ear.
33. Opacity of the lens is also known as ____.

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

____ 34. protect the brain a. sulci
____ 35. cavities within the brain b. thalamus
____ 36. shock absorber for the CNS c. papillae
37. contains ascending and descending tracts  
38. bridge brain and spinal cord  
39. superior part of the diencephalon  
40. mesencephalon  
41. groove in the brain  
42. connects cerebral hemispheres  
43. deep in the lateral sulcus  
44. shaped like a butterfly  
45. fight or flight  
46. taste buds  
47. transparent front of the eye  
48. eye liquid  
49. hammer  
50. stirrup  
51. tympanic membrane  
52. from the ear to the pharynx  
53. middle ear infection  

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C. Key Terms

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

54. Anesthesiologist:

55. Auditory/eustachian tube:

56. Auricle:

57. Autonomic nervous system:
58. Cerebral aqueduct/aqueduct of Sylvius:

59. Cerebrum:

60. Ciliary body:

61. Conjunctivitis:

62. Decussation pyramids:

63. External auditory meatus:

64. Fovea centralis:

65. Glaucoma:

66. Infundibulum:

67. Interventricular foramen/foramen of Monroe:
68. Mammillary bodies:

69. Medulla oblongata:

70. Occipital lobe:

71. Optic chiasma:

72. Optic disk:

73. Oval window:

74. Parasympathetic division:

75. Parkinson's disease:

76. Pons varolii:

77. Reticular formation:
78. Retina:

79. Rhodopsin:

80. Round window:

81. Sclera:

82. Sulci:

83. Taste cells:

84. Ventral cerebral peduncles:

85. Ventricles:

86. Vitreous humor:
D. Labeling Exercise

87. Label the parts of the ear as indicated in Figure 11-1.

Figure 11-1

A. ____________________________
B. ____________________________
C. ____________________________
D. ____________________________
E. ____________________________
F. ____________________________
G. ____________________________
H. ____________________________
88. Label the parts of the eye as indicated in Figure 11-2.

![Diagram of the eye with labels](image1)

A. ___________________________  E. ___________________________
B. ___________________________  F. ___________________________
C. ___________________________  G. ___________________________
D. ___________________________  H. ___________________________

**E. Coloring Exercise**

89. Using Figure 11-3, color the cerebrum red, the occipital lobe green, the cerebellum blue, the midbrain orange, the pons yellow, and the medulla brown.

![Diagram of the brain](image2)
F. Critical Thinking

Answer the following questions in complete sentences.

90. Explain the mechanism of the fight-or-flight response.

91. What is the importance of the hypothalamus?

92. How would damage to the cerebellum affect the body?

93. How can the common cold affect the sense of taste?

94. How does flying in an airplane affect hearing?

95. Why should children not go to school when they have “pinkeye”?

96. Why do some middle-aged people have to get reading glasses?

97. What would be a possible treatment for glaucoma?
98. Identify age-related changes in the nervous system. Briefly explain the effects these changes have on older adults.

99. Of the career options associated with the nervous system, select the one that is most interesting to you. Tell why you consider this option as a potential career.

100. Distinguish between a psychiatrist and a psychologist.

G. Crossword Puzzle
Complete the crossword puzzle using the following clues.

ACROSS
5. Nerve that controls head movements
8. Diencephalon part attached to the pituitary
9. Eyeball's colored part
10. Decrease in near vision
12. Seizures
14. Nerve that senses taste
16. Smallest of the cranial nerves
17. Relays sensory impulses
19. Retina cells that produce color
20. Nerve that controls smell
22. Largest of the cranial nerves
23. Retina cells very sensitive to light
24. Nerve that controls tear glands
26. Nerve that controls eyelid movement
28. Surrounds the third ventricle
29. Ear wax
30. Headache

DOWN
1. Nerve that controls balance and hearing
2. Outer part of the ear
3. Brain folds
4. Nerve that conveys sensation in the larynx
6. Nerve that conveys vision impulses
7. Nearsightedness
11. Elevations of the tongue
13. Anvil
15. Nerve that controls swallowing
18. Eye's outermost layer
21. Lockjaw
25. Nerve that controls eyeball movement
27. Rod pigment

CHAPTER QUIZ

1. The disease that produces convulsive seizures is
   a. epilepsy
   b. cerebral palsy
   c. otitis media
   d. tetanus
   e. encephalitis
   Answer:

2. The disease that produces infection in the middle ear is
   a. epilepsy
   b. cerebral palsy
   c. otitis media
   d. tetanus
   e. encephalitis
   Answer:

3. The disease that produces defective muscular coordination is
   a. epilepsy
   b. cerebral palsy
   c. otitis media
   d. tetanus
   e. encephalitis
   Answer:

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4. Farsightedness is
   a. myopia
   b. hyperopia
   c. presbyopia
   d. glaucoma
   e. amblyopia

   Answer:

5. An accommodation disease of aging is
   a. myopia
   b. hyperopia
   c. presbyopia
   d. glaucoma
   e. amblyopia

   Answer:

6. A disease that causes destruction of the retina is
   a. myopia
   b. hyperopia
   c. presbyopia
   d. glaucoma
   e. amblyopia

   Answer:

7. Nearsightedness is
   a. myopia
   b. hyperopia
   c. presbyopia
   d. glaucoma
   e. amblyopia

   Answer:

8. The part of the ear allowing for pressure equalization is the
   a. stapes
   b. vestibule
   c. auricle
   d. tympanum
   e. eustachian tube

   Answer:

9. The part of the ear allowing for balance is the
   a. stapes
   b. vestibule
   c. auricle
   d. tympanum
   e. eustachian tube

   Answer:

10. The part of the ear acting like a drum head is the
    a. stapes
    b. vestibule
    c. auricle
    d. tympanic membrane
    e. eustachian tube

    Answer:

11. Night blindness can be caused by a deficiency of
    a. vitamin A
    b. vitamin D
    c. vitamin K
    d. vitamin B
    e. vitamin E

    Answer:
12. The ability to see color is due to
   a. rods                      d. sclera
   b. choroid                   e. lens
   c. cones

**Answer:**

13. The white, outermost layer of the eye is the
   a. pupil                      d. sclera
   b. choroid                   e. lens
   c. retina

**Answer:**

14. The cells of the retina that synapse with ganglia cells are
   a. unipolar                   d. multipolar
   b. bipolar                   e. photoreceptors
   c. conical

**Answer:**

15. Glaucoma is caused by a defect of the
   a. sclera                    d. lens
   b. vitreous humor            e. choroid
   c. aqueous humor

**Answer:**

16. Rhodopsin is found in the
   a. rods                      d. choroid
   b. sclera                    e. lens
   c. cones

**Answer:**

17. The actual taste function is found on the
   a. papillae                  d. taste hairs
   b. salivary glands          e. epithelial cells
   c. taste pores

**Answer:**

18. Chemoreceptors are used in the sense of
   a. taste                    d. hearing
   b. sight                    e. touch
   c. smell

**Answer:**

19. The cranial nerves number
   a. 6                        d. 36
   b. 12                       e. 48
   c. 24

**Answer:**
20. The neurotransmitter associated with the parasympathetic system is
   a. epinephrine              d. serotonin
   b. adrenaline              e. acetylcholine
   c. norepinephrine

   Answer:

21. Which of the following is NOT a function of the cerebellum?
   a. reflex                   d. balance
   b. coordination            e. movement
   c. posture

   Answer:

22. Which lobe of the cerebrum evaluates hearing input?
   a. parietal                 d. occipital
   b. frontal                 e. none of the above
   c. temporal

   Answer:

23. Which lobe of the cerebrum is involved in visual input?
   a. parietal                 d. occipital
   b. frontal                 e. none of the above
   c. temporal

   Answer:

24. Which lobe of the cerebrum is involved in evaluating sensory information?
   a. parietal                 d. occipital
   b. frontal                 e. none of the above
   c. temporal

   Answer:

25. Which lobe of the cerebrum controls moods, aggression, and motivation?
   a. parietal                 d. occipital
   b. frontal                 e. none of the above
   c. temporal

   Answer:

26. Each hemisphere has folds called
   a. gyri                    d. lobes
   b. sulci                   e. none of the above
   c. fissures

   Answer:

27. The mind controlling the body phenomenon is located in the
   a. thalamus                d. cerebellum
   b. hypothalamus           e. none of the above
   c. midbrain

   Answer:
28. The ventral cerebral peduncles are contained in the
   a. cerebellum   d. midbrain
   b. cerebrum     e. none of the above
   c. medulla oblongata

   Answer:

29. The foramen of Monroe connects
   a. sulci    d. lobes
   b. gyri     e. none of the above
   c. ventricles

   Answer:

30. Which of the following is an area of the brainstem?
   a. medulla oblongata    d. corpus callosum
   b. thalamus             e. none of the above
   c. cerebellum

   Answer:

31. What is the outermost layer of the cranial meninges?
   a. pia mater d. dura mater
   b. arachnoid mater e. corpus callosum
   c. occipital lobe

   Answer:

32. The part of the epithalamus that secretes melatonin is the
   a. pineal gland    d. thalamus
   b. pituitary gland e. optic chiasma
   c. mammillary body

   Answer:

33. The colored part of the eye that consists of smooth muscle surrounding the pupil is the
   a. cornea d. iris
   b. sclera e. vitreous humor
   c. choroid

   Answer: