

Brain & Cranial Nerves Study Guide
C14 // Toratora and Derrickson

Please Note: I know there are a lot of questions in this study guide. The first part of this study guide reviews lab objectives. This will be covered on the lab exam. The second part of the study guide covers lecture objectives. This will be covered on the lecture exam.

The nervous system, more than any system, requires you to know the structural relationships in order to understand the function of the brain. I will answer all these questions in my lecture on the brain. Make sure you have your study guide in class and be ready to ask questions!

1. What are the three divisions of the brain?
2. Imagine the brain as a mushroom. If you take the mushroom's cap off then you are left with a stem-like structure. In the brain, what structures form the "stem"? What structure forms the cap?
3. What is the definition of rostral and caudal?
4. What four structures make up the brainstem?
5. What is the definition of these terms: sulcus, gyrus, and fissure?
6. What is the significance of the central sulcus?
7. What is the significance of the pre-central gyrus? Nickname?
8. What is the significance of the post-central gyrus? Nickname?
9. What part of a neuron makes up the brain's white matter and grey matter? In general, how is the white and grey matter arranged in the brain? How is this different in the spinal cord?
10. What are cranial sinuses? How do they form? Their locations?
11. What is the function of the arachnoid villus? Location? What principle describes the movement of fluid across the wall of the arachnoid villus?
12. What are the cranial ventricles? How many ventricles are in the brain?
13. What is cerebrospinal fluid?
14. How does CSF "flow" through the brain and spinal cord? (see video)

15. How do “special ependymal cells” help to produce some of the CSF? What is the location of these structures? What are these structures called?
16. What is the blood brain barrier? Significance? What glial cell forms the BBB?
17. Why do we need a BBS?
18. How many types of “brain barriers” are there in the brain?
19. Is there a brain-cerebral spinal fluid barrier? Significance
20. Where are the circumventricular organs found? What is the importance of the circumventricular organs? What is the “downside” to these structures?
21. What are the functions associated with the medulla oblongata? What term is used to describe these structures? Are they white or grey?
22. The pons is a relay station for nerve tracts in the CNS called peduncles. Three different peduncles connect the pons with the cerebellum. What is the role of these nerve tracts? (note: Think about the movement of the action potentials)
23. What is the main function of the cerebellum? Examples
24. There are many important nuclei in the midbrain. One nucleus is the substantia nigra. What molecule does this nucleus produce? Where will this molecule be used? What disease is caused by the substantia nigra not making this molecule?
25. Where is the reticular formation located? What types of functions are associated with the reticular formation?
26. What are the three main structures of the diencephalon? What is the nickname for the largest member of this group?
27. What type of action potentials pass through the thalamus? What is the one exception? Significance?
28. What division of the brain is the control center (i.e. the boss) of the autonomic nervous system and endocrine system? What do these systems control? (Hint: think about Chapter 1) Significance?
29. Where is the basal nuclei located (relative to the thalamus)? What is the general function of the basal nuclei?
30. Where is the limbic system located?
31. What is the limbic system’s “nickname”?

32. What type of functions are associated with limbic system structures?
33. What are the names and locations of the cerebrum's lobes? What types of functions are assigned to these lobes? (Note: you only need to know the ones we discuss in class)
34. When we study the brain's functions, we define primary and association areas of function. What is the significance of this in motor and sensory function? Explain this answer using the example given in class about coins in your pocket.
35. The white matter of the cerebrum form tracts. These tracks may carry action potentials up and down the CNS, or between hemispheres, or between gyrus within the same hemisphere. What are the three types of tracts in the cerebrum?
36. Where is the hippocampus located? The hippocampus is part of what system? What is the significance of the hippocampus in learning?
37. Where is the amygdala located? The amygdala is part of what system? What is the significance of the amygdala in learning?
38. What is the function of the orbitalfrontal cortex? Location?
39. What is the function of the hypothalamus? Nickname?
40. Think about evolution and the brain. As the brain changed over time, what three brain formations occurred? Do we still see these formations in our modern brain?
41. Where do we form and store our feelings and emotional memories? Are these conscious or subconscious? What is the relationship between this area and the cerebrum? Are the memories of the cerebrum conscious or subconscious? How may you explain a bad test score using this question's content? Can you explain possible advantages and disadvantages in this relationship between these two areas from the perspective of evolution?
42. What are somatosensory (somesthetic) sensations? How are these sensations routed to the primary somatosensory cortex? Number of neurons and route?
43. Where is the primary somatosensory cortex located? Where is the somatosensory association area located? What is the functional relationship between these two areas? (Hint: Think about putting your hand in your pocket and feeling different coins.)
44. What is the primary motor gyrus located? Where is the motor association area located? How do these areas interact? (Hint: Think about tying your shoes or typing in your computer password)

45. How many neurons are there between the primary motor cortex and a skeletal muscle? What are these neurons called? Their locations?
46. How many neurons are there between a skeletal muscle and the somatosensory gyrus? What are these neurons called? Their locations?
47. There are different motor pathways for skeletal muscles in the head and neck and for skeletal muscles below the head and neck? Explain
48. What is cognition?
49. What is the difference between perceptual memory, short term memory, and long term memory?
50. What is the difference between declarative (explicit) memory and procedural (implicit) memory? (Use these phrases to distinguish these two types of memory: Knowing what VS Knowing how)
51. What brain structures are required for the formation of new declarative memory?
52. What brain structures are required for the formation of new procedural memory?
53. What is the general function of the prefrontal cortex? Nickname for its functions? What other areas of the brain communicate with the prefrontal cortex?
54. What is the function of the orbitalfrontal cortex? What other areas of the brain communicate with the orbitalfrontal cortex?
55. What is motor control?
56. What structure in the brain compares the intent and performance in motor control?
57. Where is the primary motor cortex located? What is the function of the primary motor cortex?
58. What is the relationship between upper and lower motor neurons?
59. What is the relationship between the thalamus and the somatosensory cortex? Do all sensations pass through the thalamus? (Hint: think about freshly baked chocolate chip cookies)
60. Where is Broca's area located? What is its function? What is its spatial relationship to the motor strip's "homunculus model"?
61. Where is Wernicke's areas located? What is its function? What is its spatial relationship between other brain functions?

62. Which cerebral hemisphere dominates in language function? What does the non-dominant Wernicke area contribute to language?
63. What do we mean by Cerebral Lateralization? Think in terms of our language or the ability to answer these questions VS painting or playing music.
64. What are cranial nerves? Where do they originate? How do they reach their target tissue?
65. Are cranial nerves sensory or motor? Explain
66. What is the function of these cranial nerves: I, II, VIII, X.
67. What is the difference between the precentral gyrus and postcentral gyrus?
68. Where are the control centers for heart and respiratory regulation located?
69. What is the startle reflex? What brain structures are associated with the sound and sight startle reflex?
70. Where is the reticular formation located? Functions
71. What happens if the tract between the reticular formation and the cerebrum is broken? What is this condition called?