

## The Brain & Cranial Nerves

### Chapter 14 Study Guide

Please Note: There are a lot of questions in this study guide, however Many of the questions are lab objectives. These questions will be covered on the lab exam. The questions about function will be covered on the lecture exam.

In neuroscience, in order to understand the function of the brain, you must first understand its structure. This is true about all organs in the human body but even more so in brain science. I will answer all of these questions in my lectures bout the brain. Make sure you bring your study guide questions to class!

1. What is the difference between a sulcus and a fissure?
2. What is a gyrus?
3. What is the significance of the following structures? (longitudinal fissure, central sulcus, lateral sulcus, transverse cerebral fissure) Fig 14.1
4. Compare the meninges in the spinal cord to the meninges in the brain. How is this membrane different in the spinal cord and brain? Fig 14.5
5. What is a brain ventricle? How many ventricles are there in the brain?
6. What is in the ventricles? What is it called? Functions?
7. How does the fluid in the ventricles flow from one ventricle to the next ventricle? Fig 14.7
8. What is an arachnoid villus? How is this formed? Function?
9. What are cranial sinuses? How are they formed? Function?
10. What is the relationship between the ventricles and the cranial sinuses?
11. What is the name of the structure in the roof of the ventricles that produce some of the cerebral spinal fluid found in the ventricles?
12. How do “special ependymal cells” produce CSF? Where ae these structures located? What type of barrier is formed by these cells? What are these structures called?
13. What is the force that describes the movement of fluid across the wall of the arachnoid villus?
14. What is the blood brain barrier? What glial cell forms the BBB?

15. What is the significance of the blood brain barrier?
16. Is there a cerebral spinal fluid-brain barrier between the CSF in the ventricle and the brain neuron's interstitial fluid? Significance
17. What are circumventricular organs? Function? Locations? Significance?
18. What is the potential problem associated with the circumventricular organs?
19. What are the three division of the brain?
20. What four structures make up the brain-stem? What two structures are not part of the brainstem? (Ans 1: medulla oblongata, pons, mid-brain, diencephalon) Note: this definition varies between neuroscientist – I prefer to include the diencephalon as part of the brain stem // Ans 2: cerebrum and cerebellum) Fig 14.8
21. What is on either side of the central sulcus?
22. What is the significance of the pre-central gyrus? Nickname?
23. What is the significance of the post-central gyrus? Nickname?
24. What is the significance of the longitudinal fissure?
25. What part of a neuron makes up the brain's white matter?
26. What part of a neuron makes up the brain's grey matter?
27. In general, how is the white and grey matter arranged in the brain? How is this different from the white and grey matter in the spinal cord?
28. What is the significance of the triune brain theory? What does this tell us about our modern brain? Give reference animals for each brain formation.
29. What functions are preformed by these structures: association tracts, commissural tracts, and projection tracts? Fig 14.14
30. What functions are associated with the medulla oblongata? What is the general name for the structure associated with these individual functions? Are these structures white or grey?
31. The pons is a relay station for nerve tracts which are called penduncles Three different penduncles connect the pons to the cerebellum. What is the role of these three nerve tracks? Fig 14.23
32. What is the main function of the cerebellum? (one word!) Give Examples

33. There are many important nuclei in the midbrain. One nuclei is the substantia nigra. What molecule does this nuclei produce? From this molecule, what neurotransmitter is formed and where does this neurotransmitter travel to? What disease is caused if the substantia nigra does not produce this molecule?
34. Where are the control centers for heart and respiratory regulation located?
35. Where is the reticular formation located? What functions are associated with the reticular formation?
36. What happens if the reticular formation is temporarily disconnected from the cerebrum?
37. What happens if the reticular formation is permanently disconnected from the cerebrum?
38. What are the three main structures of the diencephalon? What is the nickname for the largest member of this group?
39. What type of action potentials pass through the thalamus?
40. What sensation does not pass through the thalamus? Evolutionary significance?
41. What division of the brain is the control center (i.e. the boss) of the autonomic nervous system and endocrine system? What mechanism is regulated by this structure? Significance?
42. Where are the basal nuclei located? What is the general function of the basal nuclei? What may the basal nuclei play a role when you are driving your car?
43. How does the basal nuclei regulate motor signals to the thalamus? Significance
44. What is the function of the hypothalamus? Nickname?
45. Where is the limbic system located? (i.e. also called the limbic lobe)
46. What is the limbic system's "nickname"? (What is an alternative "nickname"?)
47. What functions were acquired with the formation of the limbic lobe? (hint: two important functions) (Ans: innate emotions + ability to remember experiences as either pleasant or unpleasant) What is the significance?
48. How is the limbic system connected to the cerebrum? Significance?

49. What are the names and locations for the lobes of the cerebrum? What are the general functions assigned to each lobe? (Note: you only need to know the ones we discuss in class)
50. When we study the brain's structures, we recognize primary and association areas for different motor and sensory functions. What is the significance of this duality in motor and sensory functions? Explain this answer using the example given in class about coins in your pocket or facial recognition.
51. Where is the hippocampus located? The hippocampus is part of what system? What is the significance of the hippocampus? What type of learning is associated with the hippocampus?
52. Where is the amygdala located? The amygdala is part of what system? What type of learning is associated with the amygdala-basal ganglia-cerebellum?
53. What is the function of the prefrontal cortex? Nickname for this region? What type of function is associated with the prefrontal cortex?
54. The frontal medial orbital cortex is part of the frontal lobe. What type of function is associated with the FMOC? How is this structure located in relationship to the eyes? What is the functional relationship between the FMOC and other frontal lobe functions?
55. What other area of the brain has bi-directional tracts with the prefrontal cortex?
56. How may you explain a bad test score if you received bad news just before you started the exam?
57. What is the advantage for the cerebrum to lose control of the body and to allow the limbic lobe to take control of the body in face of imminent dangers? Explain in terms of a possible event in our evolutionary past?
58. What is cognition?
59. What are memories?
60. What is the difference between “knowing what” and “knowing how”?
61. What brain structure is required to form new declarative memory?
62. What brain structure is required to form new procedural memories?
63. What is the significance of these terms: consolidation, retrieval, reconsolidation?

64. What is the difference between perceptual memory, short term memory (working memory), and long term memory?
65. Are the memories of the cerebral cortex conscious or subconscious?
66. Are the memories of the limbic system conscious or subconscious? Do these memories influence our judgement? Explain using the smashed thumb!
67. What are somatosensory (somesthetic) sensations? Where is the origin of this sensation? The destination? How many neurons are required to relay this information between the origin and destination? What do we call these neurons?
68. Where is the somatosensory association area located in the brain? What is the functional relationship between the somatosensory gyrus and the somatosensory association area? (Hint: Think about putting your hand in your pocket and feeling different coins.)
69. What is motor control?
70. What structure in the brain compares the intent and performance in motor control?
71. Where within the brain do our thoughts generate an idea to move?
72. Where within the brain is the primary motor control strip located? Gyrus name?
73. Where is the motor association area located? What type of information is stored in the motor association area? Is this innate or learned information? Significance?
74. What is the functional relationship between the primary motor gyrus and motor association area ? (Hint: Think about tying your shoes or typing a computer password)
75. How many neurons are there between the primary motor cortex and skeletal muscles? What do we call these tracts? Locations from where to where?
76. How many neuron are between skeletal muscle and the somatosensory gyrus? What do we call these tracts?
77. What is the difference between corticobulbar and corticospinal tracts? What term is used to describe these two tracts? What type of neuron do they synapse on?
78. 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)

79. Where is Broca's area located? What type of language function is associated with Broca's area? Think about the motor strip's "homunculus model" and Broca's area. What is the significance?
80. Where is Wernicke's areas located? What type of language function is associated with Wernicke's area? Why is Wernicke's area location significant in relationship to other sensory areas?
81. Which cerebral hemisphere dominates in language function? What does the non dominate language hemisphere's Wernicke area contribute to language?
82. What is the significance of Cerebral Lateralization? Think in terms of language VS painting a picture or playing music.
83. What are cranial nerves? Where do they originate? How do they reach their target tissue?
84. Are cranial nerves sensory or motor? Explain
85. What is the function of these cranial nerves: I, II, VIII, X.
86. What is the difference between the precentral gyrus and postcentral gyrus?
87. What is a startle reflex? What brain structures are associated with sound and sight startle reflexes?
88. Where is the reticular formation located? Functions
89. Where is the pineal gland located? What does the pineal gland produce? Target tissue for the pineal gland's secretions? Function?