

## C14 Study Guide (2/21/2025)

### The Brain Meninges and Cerebral Spinal Fluid

#### C14-1 Evolution of the Brain

- 1 What is the Triune Brain Theory? How do you characterize each formation? Give an animal example for each? Do these formations still exist in our brains today?
- 2 What was the great achievement associated with the formation of the paleomammalian formation (also called the limbic system)? (C14\_2 slide #8)
- 3 What type of knowledge is the domain of the neocortex? What type of animals have a neocortex? Where is this type of knowledge derived from?

#### C14-2 Brain Meninges, Ventricles, and Cerebral Spinal Fluid

- 4 What are the three layers of the meninges surrounding the brain? How is the brain's dura mater different than the spinal cord's dura mater? What unique structure is created by the brain's dura mater? Purpose? Location for this structure? Does the brain have an epidural space?
- 5 What is the structure and function for the arachnoid villus? What type of force occurs at the arachnoid villus? What type of fluid is in the sinuses created by the dura mater? Where does the fluid in a brain sinus drain into?
- 6 What is the structure of the brain's ventricles? What cell type form the walls of the ventricles? How many ventricles? How are they connected? What is the fluid inside the ventricles called? What structure in the roof of each ventricle forms some of this fluid? After flowing through the ventricles, where does this fluid drain into? After draining into this space, then how will it eventually return to the systemic circuit? (Note: best to draw picture to answer this questions)
- 7 What are the functions of the cerebral spinal fluid?
- 8 What is the structure of the choroid plexus? How do the glial cells of the choroid plexus different than the glial cells forming the walls of the ventricles?
- 9 What happens to the brain if blood flow is stopped for 10 seconds, 2 minutes, or 4 minutes?
- 10 What is the "blood brain barrier" structure and function? What glial cell creates the blood brain barrier? What type of cell junction makes this possible? Clinical significance?
- 11 What is the blood-cerebral spinal fluid barrier? Location and name of structure?
- 12 Is there a cerebral spinal fluid brain barrier in the ventricles? Significance?
- 13 What are the circumventricular organs? Location? Function? Clinical significance?

### C14-3 Brain Structure

- 14 What are the three divisions of the brain?
- 15 What are the four parts of the brainstem? What structure is on the dorsal surface of the brainstem?
- 16 What are the five lobes of the cerebrum? What are the following structures: longitudinal fissure, central sulcus, gyri, and sulci?
- 17 How is the white and gray matter in the brain arranged? How does this differ from the spinal cord?
- 18 What is the function of the association fibers, projection fibers, and commissural fibers?
- 19 Where is the limbic system located?
- 20 Where are the basal ganglia located?
- 21 What are brain ventricles? How many? Location? Filled with what? How is this fluid formed and how does it leave the ventricles?
- 22 What type of functions occur on either side of the central sulcus?

### C14-4 Brain Functions

- 23 Where is the medulla oblongata located? What is the term used to describe the gray areas in the medulla oblongata? What functions are associated with the different gray areas?
- 24 What structures are associated with the midbrain? What structure in the midbrain is called the origin of addiction?
- 25 The peduncles enter and exit the cerebellum at the level of the pons? What is the function of the peduncles?
- 26 What region is defined by the length of the cerebral aqueduct? What two structures does this connect?
- 27 What are the four structures that sit at the top of the midbrain? They are divided into upper and lower structure? Names? Function? Together they are responsible for what?
- 28 Where is the reticular formation located? What three stimuli may activate the reticular formation? What is this system called? If activated, where does the RAS signal pass through? What is the final result of these actions? What does it “awaken”? Explain why some students like to study in a cafeteria?
- 29 What occurs if the connection between the reticular formation and the cerebrum is broken?
- 30 What do we call the state of being if we “temporarily” disconnect the reticular formation from the cerebrum? What three help to allow this to happen?
- 31 What spinal tract sends pain signals into reticular formation? What is the response?

- 32 What are the three major parts of the diencephalon? What is the nickname for the thalamus? Sensory information that enters the thalamus is split into two different pathways. Where do these signals map to? Significance?
- 33 What is the only sense that does not pass through the thalamus? Where does this sensation path go to first? Significance? (Hint: conscious vs subconscious)
- 34 How do you define the margins of the hypothalamus? General shape?
- 35 What two systems are directly regulated by the hypothalamus? What is it the boss of?
- 36 The hypothalamus consists of many nuclei. Each nuclei regulates a different function. What type of functions are associated with these nuclei? How would you compare these nuclei to the nuclei in the medulla oblongata?
- 37 What best describes in general terms the function of the cerebellum? Give examples. What is the role of the cerebellum in motor control? What is motor control? Mechanism? Structure?
- 38 Describe the functional map of the cerebrum. What structures/functions are on either side of the central sulcus? Explain the significance of the two association areas on either side of the central sulcus?
- 39 What function is associated with the precentral gyrus?
- 40 What function is associated with the motor association area?
- 41 What function is associated with the prefrontal cortex? What two phases best describe this brain structures' functions?
- 42 What is the function of the medial orbital frontal cortex?
- 43 What is the function of the interior cingulate gyrus?
- 44 What is the significance of somatoatoy? What is the homuculus?
- 45 What is the general function of the frontal cortex? Nickname? What is the general function of the limbic system? Nickname? Which structure does not fully mature (hardwire) until about age 25 years? Before this time, which brain structure dominates? Explain possible results.
- 46 As an adult, how might stress upset the balance between the frontal cortex and the limbic system? Significance? What is the difference between the fast and slow brain structures? Functions?
- 47 What is the function of the basal ganglia? Associated functions of basal ganglia?
- 48 What are the two language centers in the cerebrum? Locations. What are the two type of aphasias associated with these language centers?

- 49 What are memories? What structure is need to form new memories? Where do we first store these memories? How long does it take to form long term forever memories? Will we always be able to retrieve these memories?
- 50 What is the difference between procedural and declarative memory.
- 51 What is the function of the claustrum?
- 52 What is the function of the salience network?

#### C14-5 Cranial Nerves and Cerebral Lateralization

- 53 Where are the cranial nerves located? How many? Where do most of the cranial nerves go to? What is the one exception?
- 54 What is the name and function for these four cranial nerves? CN1 / CN2 / CN 8 / CN 10.
- 55 What is cerebral lateralization? How do you characterize the function of the left hemisphere? Right hemisphere?

#### C14-6 Neural Coding and Memory

- 56 Where does memory acquisition occur?
- 57 What is the difference between declarative and procedural memory?
- 58 Where are memories first stored? What brain structure is required to form new memories? What do we call these memories? How long before these memories become “life long memories”? Stored where?
- 59 What is the function of Broca’s Area and Wernicke’s Area in language? (explain receptive vs expressive language)