

*Questions on readings: Brodal, also Schneider chapter.*

1. Which major hypothalamic division can be divided into multiple distinct nuclei (e.g., by Le Gros Clark in 1936)? How can the remainder of the hypothalamus be characterized?
2. How can a circulating hormone like angiotensin II control hypothalamic neurons even though it does not pass through the blood-brain barrier?
3. What is diabetes insipidus?
4. What is the importance of afferents to the hypothalamus from the nucleus of the solitary tract in the hindbrain?
5. The cingulate cortex (a paralimbic cortical area above the corpus callosum) projects to the hippocampal formation. Describe the pathway from there to the hypothalamus. How does a pathway go from there back to the cingulate gyrus? (The loop is called "Papez' circuit".) (Note: Brodal on p. 400 summarizes a different pathway from cingulate cortex to hypothalamus *via* the septal nuclei. This is not usually mentioned as part of the Papez' circuit.)
6. How does hypothalamus send influences to the cerebral cortex?
7. A person's mental state can influence the endocrine organs *via* the hypothalamus. The influence can go in the reverse direction: the hypothalamus can influence a person's mental state in major ways. What are some effects of disturbance of the hypothalamus during neurosurgical procedures?

*Questions on readings: Nauta & Feirtag*

8. In Nauta's view, what is the relative importance of direct hypothalamus to spinal cord pathways vs. polysynaptic pathways?
9. What is misleading about the names "autonomic nervous system" and "voluntary (somatic) nervous system"?
10. (Review) Contrast the styles of motor innervation of somatic muscles and smooth muscles (including the contrast between sympathetic and parasympathetic).
11. (Review) How does the innervation of the sweat glands in the skin differ from sympathetic innervation of other organs?

12. How does Nauta define homeostasis?
13. Describe Rudolf Thauer's experiments on disconnection of the hypothalamus in rabbits. The results support Nauta's view of the importance of polysynaptic pathways controlling visceral activities.
14. (Review) Contrast the pathways for hypothalamic control of the two divisions of the neurohypophysis (pituitary). (See also Brodal, Schneider.)

*Questions on readings: Swanson*

15. What appears to be the critical forebrain area for “spontaneous locomotor behavior” (intrinsically generated locomotion)?
16. Summarize in general terms the major functions of the “behavioral control column” that extends from rostral hypothalamus to caudal midbrain. (Swanson ch 6)
17. What were the three widely projecting monoamine-containing systems first characterized by Dahlström and Fuxe in the 1960s, and the locations of the cell bodies? Several more diffusely projecting systems have been discovered since that time. Describe one of them with cells located in the hypothalamus. (Swanson ch 7; also Schneider chapter 17)
18. What is the difference in operation of the parvocellular and magnocellular portions of the autonomic motor system of the hypothalamus? Give examples of functions of each of these portions.

*Questions based on Schneider chapters and lectures:*

1. Compare the two arousal systems of the midbrain.
2. What homeostatic mechanisms are associated with the hypothalamus? (Give examples.)
3. Give specific examples of appetitive and of consummatory behavior.
4. Where would you expect hunger and satiety cues to influence the CNS? Why?
5. What is evidence that attack motivation in cats is separate from hunger?
6. What is a major “reward pathway” in the mammalian CNS?
7. The hypothalamus has two major divisions, medial and lateral. What is a major difference between these two divisions?
8. Describe the basic Papez’ circuit.
9. How are the Papez’ circuit structures connected to non-limbic neocortical areas?
10. What is the “basal forebrain”? Name some structures of this region.
11. Describe two ways that the hypothalamus can influence the neocortex.

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## 9.14 Brain Structure and Its Origins

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