

9.10/9.100 REVIEW QUESTIONS

Motor System Anatomy and Physiology

1. For each structure, know (1) generally what aspects of movement or posture it controls, and (2) what sensory inputs it gets:
 - a) Spinal cord segment
 - b) Brainstem: vestibular nucleus, red nucleus, superior colliculus
 - c) Primary motor cortex
 - d) Premotor cortex
 - e) Supplementary motor area
 - f) Cerebellum
 - g) Basal ganglia
2. What is Sherrington's "final common pathway"?
3. What is motor equivalence?
4. What kinds of movement parameters are encoded by neurons of the primary motor cortex? What can you tell about a movement from looking at the firing rate of a single motor cortical neuron?
5. Which motor cortical area is activated when you simply imagine making a movement? What does this imply about the function of this area? What are the effects of lesioning this area?
6. What are the three functional divisions of the cerebellum? Which parts of the cerebellar cortex and deep nuclei correspond to each division? What aspects of motor behavior do these three subdivisions contribute to? What are the effects of lesions in each subdivision?
7. What are the main sources of input to the cerebellum? What pathways do these inputs take? What are the output sources of the cerebellum, and what brain structures are their targets?
8. What evidence is there to suggest the cerebellum might be involved in motor learning?
9. What are the sources of input to the basal ganglia? What nuclei receive this input? What are the output nuclei of the basal ganglia, and where does their output go?

10. What effect does dopamine have on cells in the striatum? Where does the dopamine come from? What disease is caused by the destruction of these dopamine-containing cells?

11. What are the direct and indirect pathways? What effects do they have on activity in the thalamus?