

Unit 5 Study Guide: The Nervous System

1. List and describe the three interrelated tasks/functions of the nervous system.
2. Briefly define/describe the following terms: central nervous system, peripheral nervous system, neuron, sensory neuron, motor neuron, interneuron, nerve.
3. Diagram the basic body plan of a neuron, labeling all parts and describing the function of each.
4. Discuss the electrical signals neurons use to conduct information. Be sure you mention the role of ions, the effect of the insulating layer that surrounds many axons, and how different intensities of signals are encoded.
5. Discuss the chemical signals used to transmit information from neuron to neuron. Diagram a chemical synapse, labeling all parts and describing the function of each. What are the two possible outcomes of synaptic transmission (i.e., what are the two possible responses of the “receiving” neuron)? How is the action of neurotransmitters limited?
6. Describe the complex structure of chemical synapse and explain how this allows complex information processing.
7. What is a neurotoxin? Describe the actions of the neurotoxins discussed in class. Given a description of the action and target of a neurotransmitter (i.e., what it does to an axon or synapse), be able to deduce its effect on a whole organism.
8. Atropine is a chemical produced by the deadly nightshade plant; another common name for it is belladonna. Atropine is used as an antidote for nerve gas because it binds to receptors on muscle cell membranes and prevents their stimulation by their usual neurotransmitter. That same neurotransmitter, however, is used by the parasympathetic nervous system to stimulate the visceral organs. Using the information in your text, what symptoms would you expect in someone who has taken atropine? Optometrists also use atropine in eye drops – why?
9. Diagram and describe the hierarchical structure of the nervous system, showing the division of labor between the major divisions. Discuss how the parasympathetic and sympathetic subdivisions work together to maintain homeostasis.
10. Describe the major anatomical/physiological elements that protect the brain. What is the major “weakness” of the blood-brain barrier?
11. Diagram, identify, and describe the functions of the following regions of the brain: the brainstem, cerebellum, hypothalamus, cerebrum. Describe the cerebrum in detail, including the division of labor between cerebral hemispheres and the functions of the 4 lobes of the cerebral cortex.

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12. What is the limbic system? Using the examples we discussed in class, explain why the limbic system is sometimes called the “emotional” brain. Briefly explain how the limbic system generates motivation.
13. Define the terms “death”, “brain death” and “persistent vegetative state”. How are the three related? Describe how brain death is diagnosed. Describe the characteristics/criteria for diagnosing a persistent vegetative state and relate these to the functions of the cerebral cortex, hypothalamus, and brainstem. What is the prognosis (likelihood of recovery) for a person in a persistent vegetative state? According to current standards of medical ethics, when is it permissible to withdraw interventions such as feeding tubes from a patient in a persistent vegetative state?
14. Making reference to specific brain neurotransmitters and their actions, describe how drugs of abuse produce their pleasurable effects. What general mechanism of action do most of them share?
15. Describe the relationship between depression, serotonin, and the prescription drugs commonly used to treat depression.
16. What is Parkinson’s disease? What role does dopamine play in this syndrome, and why is dopamine sometimes used to treat it?
17. Outline the sequence of events involved in a migraine headache, being sure to identify the important neurotransmitters involved. What are triptans and how do they work to stop migraines? How many Americans suffer from migraines, and how many of those are women? If a friend told you that she routinely suffered from sinus headaches around the time of her menstrual period, and that these couldn’t possibly be migraines because she never experienced an aura, how would you respond?