

Study Guide 1: Chapters 1-3

Chapter 1: Brain Basics

1. What is the largest part of the human brain and what is its function?
2. The cerebrum is divided into _____ hemispheres, bridged together by a bundle of fibers called the _____. (6)
3. Covering the outermost layer of the cerebrum is the _____. (6)
4. What are the functions of the four lobes? (6)
5. What is the amygdala responsible for? (6)
6. The _____ controls movement and cognitive processes that require precise timing. (6)
7. What is the difference between gray matter and white matter? (7)
8. What are the two branches of the autonomic nervous system and what are their functions? (7)

9. How many neurons are in the mammalian brain?

10. The three main components of a neuron are the cell body, dendrites, and axon. What are the functions of each component? (7)

11. _____ are the contact points where one neuron communicates with another. (7)

12. Many axons are covered with a myelin sheath, which _____ the transmission of electrical signals along the axon.

This sheath is made by specialized cells called _____. (8)

13. Nerve impulses involve the opening and closing of _____. (8)

14. An action potential occurs as the neuron switches from an internal _____ charge to a _____ charge. (8)

15. When these voltage changes reach the end of an axon, they trigger the release of _____. (8)

16. NAME THE NEUROTRANSMITTER (pgs 9-11)

- a. The first neurotransmitter identified, it is released by neurons connected to voluntary terminals. It is implicated in myasthenia gravis, a disease characterized by fatigue and muscle weakness due to the blocking of receptors for this neurotransmitter.

- b. This amino acid neurotransmitter INHIBITS the firing of neurons. Its activity is increased by benzodiazepines and anticonvulsants.

- c. This amino acid neurotransmitter acts as excitatory signals, activating N-Methyl-d-aspartate (NMDA) receptors which have been implicated in learning and memory. Overstimulation by this neurotransmitter of NMDA receptors, however, can cause nerve cell damage or cell death.

- d. This catecholamine neurotransmitter is involved in movement, cognition/emotion, and the endocrine system. Deficits of this neurotransmitter in the substantia nigra is implicated in Parkinson's disease whereas blocking receptors of this neurotransmitter is the main action of many antipsychotic drugs.

- e. This catecholamine neurotransmitter is secreted by the sympathetic nervous system to regulate heart rate. Acute stress also releases this neurotransmitter from the adrenal medulla.

d. This neurotransmitter is present in blood platelets and is involved in sleep, mood, depression and anxiety. Drugs that alter this neurotransmitter's activity have been useful to relieve depression symptoms.

e. This neurotransmitter is a gas (two possible answers).

17. _____ convey the chemical message of a neurotransmitter from the cell membrane to the cell's internal biochemical machinery. (12)

18. When norepinephrine binds to receptors on the surface of the neuron, the activated receptor binds a G protein which causes _____ to convert ATP to _____ the second messenger. (12)

Chapter 2: The Developing Brain

1. The three stages of neuron development are induction, proliferation, and _____. (13)

2. During embryonic development, three layers emerge – the endoderm, the ectoderm, and the _____. (13)

3. _____, _____ enlargements on the axon's tip, actively explore the environment as they seek out their precise destination. (15)

4. Some signaling molecules are netrin, _____, and ephrin. The first netrin was discovered in a _____ and shown to guide neurons around the _____'s "nerve ring." (15)

5. _____, the wrapping of axons by extensions of glia, increases the _____ at which signals may be sent from one neuron to another by a factor up of to 100x.

6. In between the myelin are gaps, called nodes of _____, that are not covered in myelin.

7. _____, programmed cell death initiated in the cells, allows paring back.