



## Concept Review

### Chapter 14

#### Summary of Terms

**Agonist** A molecule that binds to a receptor site and initiates a biological effect.

**Analgesic** A drug that enhances the ability to tolerate pain without abolishing nerve sensations.

**Anesthetic** A drug that prevents neurons from transmitting sensations to the brain.

**Antagonist** A molecule that binds to a receptor site and does not initiate a biological effect except for that it blocks other active molecules from binding to the receptor site.

**Chemotherapy** The use of drugs to destroy pathogens without destroying the animal host.

**Combinatorial Chemistry** A laboratory approach intended to mimic nature's chemical diversity that takes advantage of the many different ways in which a series of reacting chemicals can be combined.

**Lock-And-Key Model** A model based upon the idea that there is a connection between a drug's chemical structure and its biological effect.

**Neuron** A specialized cell capable of sending and receiving electrical impulses.

**Neurotransmitter** An organic compound released by a neuron and capable of activating receptor sites within an adjacent neuron.

**Physical Dependence** A dependence characterized by the need to continue taking a drug to avoid withdrawal symptoms.

**Psychoactive Drug** A drug that affects the mind or behavior.

**Psychological Dependence** A deep-rooted craving for a drug.

**Re-Uptake** A mechanism whereby a presynaptic neuron absorbs neurotransmitters from the synaptic cleft for reuse.

**Synaptic Cleft** A narrow gap across which neurotransmitters pass either from one neuron to the next or from a neuron to a muscle or gland.

**Synergistic Effect** One drug enhancing the effect of another.

#### Review Questions

##### 14.1 Medicines Improve Health

1. What are the three origins of drugs?
2. Are a drug's side effects necessarily bad?
3. What is the synergistic effect?

##### 14.2 The Lock-and-Key Model

4. In the lock-and-key model, is a drug viewed as the lock or the key?
5. What holds a drug to its receptor site?

##### 14.3 Chemotherapy

6. Why do bacteria need PABA but humans can do without it?

7. How does penicillin G cure bacterial infections?
8. When is chemotherapy most effective against cancer?
9. How does methotrexate work?

##### 14.4 The Nervous System

10. What are the symptoms that a person's stress neurons have been activated?
11. What are some of the processes occurring in the body when maintenance neurons are more active than stress neurons?
12. What neurotransmitter is known for its strong activity in the brain's reward center?
13. What is the role of GABA in the nervous system?

**14.5 Psychoactive Drugs**

14. What neurotransmitter does nicotine mimic?
15. What drugs enhance the action of GABA?
16. What is neurotransmitter re-uptake?
17. Which neurotransmitter does LSD mimic?

**14.6 Pain Relievers**

18. What is an anesthetic?
19. What is an analgesic?
20. Where are the major opioid receptor sites located?
21. What biochemical is thought to be responsible for the placebo effect?

**14.7 Medicines for the Heart**

22. What is angina, and what is its cause?
23. What role does nitrogen oxide play in the treatment of angina?

24. How does a vasodilator reduce the workload on the heart?

**Quantitative Questions**

25. Rank the following from least ideal to most ideal places for you to throw away your expired medicines: (a) the toilet (b) the trash can (c) your local pharmacy.
26. Rank in order of increasing addictive qualities: (a) benzodiazepines (b) nicotine (c) heroine.
27. Rank in order of increasing size: (a) animal cell (b) bacterium (c) virus.
28. Rank in order of its ability to fit within the serotonin receptor site: (a) serotonin (b) LSD (c) THC.

**Solutions (Odd-Numbered)**

1. Drugs originate from plants, animals, or are synthesized.
3. When one drug enhances the effect of another it is called a synergistic effect.
5. Intermolecular attractions, such as hydrogen bonding, holds a drug to its receptor site.
7. Penicillin G inhibits the growth of bacterial colonies by binding to receptor sites that the bacteria need for building their cell walls.
9. Methotrexate interferes with the cancer cell's metabolism by binding to the dihydrofolic acid receptor site.
11. Maintenance neurons are responsible for digestion, intestinal muscle function, sharpening vision, and maintaining heart rate.
13. GABA inhibits the output of nerve impulses.
15. Alcohol and benzodiazepines effect the action of GABA.
17. LSD mimics serotonin.
21. Endorphines are thought to be responsible for the placebo effect.
23. Nitrogen oxide, NO, is the metabolic product of vasodilators, which relax muscles found within blood vessels.
25. The least ideal place to throw away your expired medicines is the toilet because it places your medicines within water sytems that usually lead to the environment. Note: waste treatment facilities are not equipped to remove pharmaceuticals, many of which end up in people's drinking water. Throwing your medicines away with solid waste is a bit safer, but rain passing through waste disposal sites leach these pharmaceuticals into ground-water. The most ideal method of disposal is to bring your expired medicines to your pharmacist or hospital who will have means of treating the expired medicine as a hazardous waste.
27. In order of increasing size: (c) virus < (b) bacterium < (a) animal cell