1 Isoproterenol produces maximal contraction of cardiac muscle in a manner similar to epinephrine. Which of the following best describes isoproterenol?
A. Full agonist.
B. Partial agonist.
C. Competitive antagonist.
D. Irreversible antagonist.
E. Inverse agonist.

2 If 10 mg of naproxen produces the same analgesic response as 100 mg of ibuprofen, which of the following statements is correct?
A. Naproxen is more efficacious than is ibuprofen.
B. Naproxen is more potent than ibuprofen.
C. Naproxen is a full agonist, and ibuprofen is a partial agonist.
D. Naproxen is a competitive antagonist.
E. Naproxen is a better drug to take for pain relief than is ibuprofen.

3 If 10 mg of morphine produces a greater analgesic response than can be achieved by ibuprofen at any dose, which of the following statements is correct?
A. Morphine is less efficacious than is ibuprofen.
B. Morphine is less potent than is ibuprofen.
C. Morphine is a full agonist, and ibuprofen is a partial agonist.
D. Ibuprofen is a competitive antagonist.
E. Morphine is a better drug to take for pain relief than is ibuprofen.

4 In the presence of naloxone, a higher concentration of morphine is required to elicit full pain relief. Naloxone by itself has no effect. Which of the following is correct regarding these medications?
A. Naloxone is a competitive antagonist.
B. Morphine is a full agonist, and naloxone is a partial agonist.
C. Morphine is less efficacious than is naloxone.
D. Morphine is less potent than is naloxone.

5 In the presence of pentazocine, a higher concentration of morphine is required to elicit full pain relief. Pentazocine by itself has a smaller analgesic effect than does morphine, even at the highest dose. Which of the following is correct regarding these medications?
A. Pentazocine is a competitive antagonist.
B. Morphine is a full agonist, and pentazocine is a partial agonist.
C. Morphine is less efficacious than is pentazocine.
D. Morphine is less potent than is pentazocine.
E. Pentazocine is a noncompetitive antagonist.

6 In the presence of picrotoxin, diazepam is less efficacious at causing sedation, regardless of the dose. Picrotoxin by itself has no sedative effect even at the highest dose. Which of the following is correct?
A. Picrotoxin is a competitive antagonist.
B. Diazepam is a full agonist, and picrotoxin is a partial agonist.
C. Diazepam is less efficacious than is picrotoxin.
D. Diazepam is less potent than is picrotoxin.
E. Picrotoxin is a noncompetitive antagonist.

7 Which of the following statements most accurately describes a system having spare receptors?
A. The number of spare receptors determines the maximum effect.
B. Spare receptors are sequestered in the cytosol.
C. A single drug–receptor interaction results in many cellular response elements being activated.
D. Spare receptors are active even in the absence of an agonist.
E. Agonist affinity for spare receptors is less than their affinity for “non-spare” receptors.

8 Which of the following would up-regulate postsynaptic β_1 adrenergic receptors?
A. Daily use of amphetamine that causes norepinephrine to be released.
B. A disease that causes an increase in the activity of norepinephrine neurons.
C. Daily use of isoproterenol, a β_1 receptor agonist.
D. Daily use of formoterol, a β_2 receptor agonist.
E. Daily use of propranolol, a β_1 receptor antagonist.E. Naloxone is a noncompetitive antagonist

1.A

2.B

3.E

4.A

5.B

6.E

7.C

8.E

1. A 3-year-old is brought to the emergency department having just ingested a large overdose of diphenhydramine, an antihistaminic drug. Diphenhydramine is a weak base with a pK_a of 8.8. It is capable of entering most tissues, including the brain. On physical examination, the heart rate is 100/min, blood pressure 90/50 mm Hg, and respiratory rate 20/min. Which of the following statements about this case of diphenhydramine overdose is most correct?

(A) Urinary excretion would be accelerated by administration of NH_4Cl, an acidifying agent

(B) Urinary excretion would be accelerated by giving $NaHCO_3$, an alkalinizing agent

(C) More of the drug would be ionized at blood pH than at stomach pH

(D) Absorption of the drug would be faster from the stomach than from the small intestine

(E) Hemodialysis is the only effective therapy

2. Botulinum toxin is a large protein molecule. Its action on cholinergic transmission depends on an intracellular action within nerve endings. Which one of the following processes is best suited for permeation of very large protein molecules into cells?

(A) Aqueous diffusion

(B) Aqueous hydrolysis

(C) Endocytosis

(D) Lipid diffusion

(E) Special carrier transport

3. A 60-year-old patient with severe cancer pain is given 10 mg of morphine by mouth. The plasma concentration is found to be only 30% of that found after intravenous administration of the same dose. Which of the following terms describes the process by which the amount of active drug in the body is reduced *after* administration but *before* entering the systemic circulation?

(A) Excretion

(B) First-order elimination

(C) First-pass effect

(D) Metabolism

(E) Pharmacokinetics

4. A 12-year-old child has bacterial pharyngitis and is to receive an oral antibiotic. Ampicillin is a weak organic acid with a pK_a of 2.5. What percentage of a given dose will be in the lipid-soluble form in the duodenum at a pH of 4.5?
(A) About 1%
(B) About 10%
(C) About 50%
(D) About 90%
(E) About 99%

5. Ampicillin is eliminated by first-order kinetics. Which of the following statements best describes the process by which the plasma concentration of this drug declines?
(A) There is only 1 metabolic path for drug elimination
(B) The half-life is the same regardless of the plasma concentration
(C) The drug is largely metabolized in the liver after oral administration and has low bioavailability
(D) The rate of elimination is proportional to the rate of administration at all times
(E) The drug is distributed to only 1 compartment outside the vascular system

6. Which of the following statements is most correct regarding the termination of drug action?
(A) Drugs must be excreted from the body to terminate their action
(B) Metabolism of drugs always increases their water solubility
(C) Metabolism of drugs always abolishes their pharmacologic activity
(D) Hepatic metabolism and renal excretion are the two most important mechanisms involved
(E) Distribution of a drug out of the bloodstream terminates the drug’s effects

7. Which statement about the distribution of drugs to specific tissues is most correct?
(A) Distribution to an organ is independent of blood flow
(B) Distribution is independent of the solubility of the drug in that tissue
(C) Distribution depends on the unbound drug concentration gradient between blood and the tissue
(D) Distribution is increased for drugs that are strongly bound to plasma proteins
(E) Distribution has no effect on the half-life of the drug

8. The pharmacokinetic process that distinguishes the elimination of ethanol and high doses of phenytoin and aspirin from the elimination of most other drugs is called
(A) Distribution
(B) Excretion
(C) First-pass effect
(D) First-order elimination
(E) Zero-order elimination

9. The set of properties that characterize the effects of a drug on the body is called
(A) Distribution
(B) Permeation
(C) Pharmacodynamics
(D) Pharmacokinetics
(E) Protonation

1.A

2.C

3.C

4.A

5.B

6.D

7.C

8.E

9.C