MULTIPLE CHOICE

1. The patient is receiving two different drugs. At current dosages and dosage forms, both drugs are absorbed into the circulation in identical amounts. Thus, because they have the same absorption rates, they are
   a. bioequivalent.
   b. synergistic.
   c. prodrugs.
   d. in a steady state.

   ANS: A
   Two drugs absorbed into the circulation in the same amount (in specific dosage forms) have the same bioavailability; thus, they are bioequivalent. A drug's steady state is the physiologic state in which the amount of drug removed via elimination is equal to the amount of drug absorbed from each dose. The term *synergistic* refers to two drugs, given together, with a resulting effect that is greater than the sum of the effects of each drug given alone. A prodrug is an inactive drug dosage form that is converted to an active metabolite by various biochemical reactions once it is inside the body.

   DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 22
   TOP: NURSING PROCESS: Implementation
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

2. When given an intravenous medication, the patient says to the nurse, "I usually take pills. Why does this medication have to be given in the arm?" What is the nurse's best answer?
   a. "The medication will cause fewer adverse effects when given intravenously."
   b. "The intravenous medication will have delayed absorption into the body's tissues."
   c. "The action of the medication will begin sooner when given intravenously."
   d. "There is a lower chance of allergic reactions when drugs are given intravenously."

   ANS: C
   An intravenous (IV) injection provides the fastest route of absorption. The IV route does not affect the number of adverse effects, nor does it cause delayed tissue absorption (it results in faster absorption). The IV route does not affect the number of allergic reactions.

   DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 23
   TOP: NURSING PROCESS: Implementation
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

3. The nurse is administering parenteral drugs. Which statement is true regarding parenteral drugs?
   a. Parenteral drugs bypass the first-pass effect.
   b. Absorption of parenteral drugs is affected by reduced blood flow to the stomach.
   c. Absorption of parenteral drugs is faster when the stomach is empty.
   d. Parenteral drugs exert their effects while circulating in the bloodstream.

   ANS: A

Drugs given by the parenteral route bypass the first-pass effect. Reduced blood flow to the stomach and the presence of food in the stomach apply to enteral drugs (taken orally), not to parenteral drugs. Parenteral drugs must be absorbed into cells and tissues from the circulation before they can exert their effects; they do not exert their effects while circulating in the bloodstream.

DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 23
TOP: NURSING PROCESS: General
MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

4. When monitoring the patient receiving an intravenous infusion to reduce blood pressure, the nurse notes that the patient's blood pressure is extremely low, and the patient is lethargic and difficult to awaken. This would be classified as which type of adverse drug reaction?
   a. An adverse effect
   b. An allergic reaction
   c. An idiosyncratic reaction
   d. A pharmacologic reaction

   ANS: D
   A pharmacologic reaction is an extension of a drug's normal effects in the body. In this case, the antihypertensive drug lowered the patient's blood pressure levels too much. The other options do not describe a pharmacologic reaction. An adverse effect is a predictable, well-known adverse drug reaction that results in minor or no changes in patient management. An allergic reaction (also known as a *hypersensitivity reaction*) involves the patient's immune system. An idiosyncratic reaction is unexpected and is defined as a genetically determined abnormal response to normal dosages of a drug.

   DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 34
   TOP: NURSING PROCESS: General
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

5. When reviewing pharmacology terms for a group of newly graduated nurses, the nurse explains that a drug's half-life is the time it takes for
   a. the drug to cause half of its therapeutic response.
   b. one half of the original amount of a drug to reach the target cells.
   c. one half of the original amount of a drug to be removed from the body.
   d. one half of the original amount of a drug to be absorbed into the circulation.

   ANS: C
   A drug's half-life is the time it takes for one half of the original amount of a drug to be removed from the body. It is a measure of the rate at which drugs are removed from the body. The other options are incorrect definitions of half-life.

   DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 29
   TOP: NURSING PROCESS: General
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

6. When administering drugs, the nurse remembers that the duration of action of a drug is defined as the time
   a. it takes for a drug to elicit a therapeutic response.
   b. needed to remove a drug from circulation.

c. it takes for a drug to achieve its maximum therapeutic response.
d. period when a drug's concentration is sufficient to cause a therapeutic response.

ANS: D
Duration of action is the time during which drug concentration is sufficient to elicit a therapeutic response. The other options do not define duration of action. A drug's onset of action is the time it takes for the drug to elicit a therapeutic response. A drug's peak effect is the time it takes for the drug to reach its maximum therapeutic response. Elimination is the length of time it takes to remove a drug from circulation.

DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 29
TOP: NURSING PROCESS: General
MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

7. When reviewing the mechanism of action of a specific drug, the nurse reads that the drug works by selective enzyme interaction. This process occurs when the drug
   a. alters cell membrane permeability.
   b. enhances its effectiveness within the cell walls of the target tissue.
   c. is attracted to a receptor on the cell wall, preventing an enzyme from binding to that receptor.
   d. binds to an enzyme molecule and inhibits or enhances the enzyme's action with the normal target cell.

   ANS: D
   With selective enzyme interaction, the drug attracts the enzymes to bind with the drug instead of allowing the enzymes to bind with their normal target cells. As a result, the target cells are protected from the action of the enzymes. This results in a drug effect. The actions described in the other options do not occur with selective enzyme interactions.

   DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 30
   TOP: NURSING PROCESS: General
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

8. When administering a new medication to a patient, the nurse reads that it is highly protein bound. Assuming that the patient's albumin levels are normal, the nurse would expect which result, as compared to a medication that is not highly protein bound?
   a. Renal excretion will be faster.
   b. The drug will be metabolized quickly.
   c. The duration of action of the medication will be shorter.
   d. The duration of action of the medication will be longer.

   ANS: D
   Drugs that are bound to plasma proteins are characterized by longer duration of action. Protein binding does not make renal excretion faster, does not speed up drug metabolism, and does not cause the duration of action to be shorter.

   DIF: COGNITIVE LEVEL: Applying (Application) REF: p. 26
   TOP: NURSING PROCESS: Planning
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

9. The patient is experiencing chest pain and needs to take a sublingual form of nitroglycerin. Where does the nurse instruct the patient to place the tablet?

a. Under the tongue
b. On top of the tongue
c. At the back of the throat
d. In the space between the cheek and the gum

ANS: A
Drugs administered via the sublingual route are placed under the tongue. Drugs administered via the buccal route are placed in the space between the cheek and the gum; oral drugs are swallowed. The other options are incorrect.

DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 23
TOP: NURSING PROCESS: Implementation
MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

10. The nurse is administering medications to the patient who is in liver failure resulting from end-stage cirrhosis. The nurse is aware that patients with liver failure would most likely have problems with which pharmacokinetic phase?
a. Absorption
b. Distribution
c. Metabolism
d. Excretion

ANS: C
The liver is the organ that is most responsible for drug metabolism. Decreased liver function most strongly affects the metabolism of a drug. Liver function does not affect the absorption and distribution of a drug. Excretion is affected only because decreased liver function may not transform drugs into water-soluble substances for elimination via the kidneys, but that is not the best answer for this question.

DIF: COGNITIVE LEVEL: Applying (Application) REF: p. 27
TOP: NURSING PROCESS: Assessment
MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

11. A patient who has advanced cancer is receiving opioid medications around the clock to keep him comfortable as he nears the end of his life. Which term best describes this type of therapy?
a. Palliative therapy
b. Maintenance therapy
c. Empiric therapy
d. Supplemental therapy

ANS: A
The goal of palliative therapy is to make the patient as comfortable as possible. It is typically used in the end stages of illnesses when all attempts at curative therapy have failed. Maintenance therapy is used for the treatment of chronic illnesses such as hypertension. Empiric therapy is based on clinical probabilities and involves drug administration when a certain pathologic condition has an uncertain but high likelihood of occurrence based on the patient's initial presenting symptoms. Supplemental (or replacement therapy) supplies the body with a substance needed to maintain normal function.

DIF: COGNITIVE LEVEL: Understanding (Comprehension) REF: p. 31
TOP: NURSING PROCESS: Implementation

MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

12. The nurse administered a sleeping pill to an elderly patient at bedtime. Two hours later, the patient was irritable, restless, and unable to sleep. The nurse describes the patient's response as which type of reaction?
    a. Allergic reaction
    b. Mutagenic effect
    c. Idiosyncratic reaction
    d. Teratogenic reaction

    ANS: C
    An idiosyncratic reaction is not the result of a known pharmacologic property of a drug or of a patient allergy but instead occurs unexpectedly in a particular patient. Such a reaction is a genetically determined abnormal response to normal dosages of a drug. An allergic reaction (also known as a *hypersensitivity reaction*) involves the patient's immune system. Mutagenic effects are permanent changes in the genetic composition of living organisms and consist of alterations in chromosome structure, the number of chromosomes, or the genetic code of the deoxyribonucleic acid (DNA) molecule. Teratogenic effects of drugs or other chemicals result in structural defects in the fetus.

    DIF: COGNITIVE LEVEL: Applying (Application) REF: p. 34
    TOP: NURSING PROCESS: Implementation
    MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

13. The patient is complaining of a headache and asks the nurse which over-the-counter medication form would work the fastest to help reduce the pain. Which medication form will the nurse suggest?
    a. A capsule
    b. A tablet
    c. An enteric-coated tablet
    d. A powder

    ANS: D
    Of the types of oral medications listed, the powder form would be absorbed the fastest, thus having a faster onset. The tablet, the capsule, and, finally, the enteric-coated tablet would be absorbed next, in that order.

    DIF: COGNITIVE LEVEL: Applying (Application) REF: p. 21
    TOP: NURSING PROCESS: Implementation
    MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

14. The nurse will be injecting a drug into the fatty tissue of the patient's abdomen. Which route does this describe?
    a. Intradermal
    b. Subcutaneous
    c. Intramuscular
    d. Transdermal

    ANS: B

Injections into the fatty subcutaneous tissue under the dermal layer of skin are referred to as *subcutaneous* injections. Injections under the more superficial skin layers immediately underneath the epidermal layer of skin and into the dermal layer are known as *intradermal* injections. Injections into the muscle beneath the subcutaneous fatty tissue are referred to as *intramuscular* injections. Transdermal drugs are applied to the skin via an adhesive patch.

DIF: COGNITIVE LEVEL: Remembering (Knowledge) REF: p. 23
TOP: NURSING PROCESS: Implementation
MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

MULTIPLE RESPONSE

1. Which drugs would be affected by the first-pass effect? *(Select all that apply.)*
   a. Morphine given by IV push injection
   b. Sublingual nitroglycerin tablets
   c. Diphenhydramine (Benadryl) elixir
   d. Levothyroxine (Synthroid) tablets
   e. Transdermal nicotine patches
   f. Esomeprazole (Nexium) capsules
   g. Penicillin given by IV piggyback infusion

   ANS: C, D, F
   Orally administered drugs (elixirs, tablets, capsules) undergo the first-pass effect because they are metabolized in the liver after being absorbed into the portal circulation from the small intestine. IV medications (IV push and IV piggyback) enter the bloodstream directly and do not go directly to the liver. Sublingual tablets and transdermal patches also enter the bloodstream without going directly to the liver, thus avoiding the first-pass effect.

   DIF: COGNITIVE LEVEL: Applying (Application) REF: p. 23
   TOP: NURSING PROCESS: General
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies

OTHER

1. A drug dose that delivers 750 mg has a half-life of 4 hours. How much drug will remain in the body after one half-life?

   ANS:
   375 mg
   A drug's half-life is the time required for one half of an administered dose of a drug to be eliminated by the body, or the time it takes for the blood level of a drug to be reduced by 50%. Therefore, one half of 750 mg equals 375 mg.

   DIF: COGNITIVE LEVEL: Applying (Application) REF: p. N/A
   TOP: NURSING PROCESS: Implementation
   MSC: NCLEX: Physiological Integrity: Pharmacological and Parenteral Therapies