Chapter 2: Pharmacologic Principles

MULTIPLE CHOICE

1. A patient is receiving two different drugs; however, at their current dose forms and dosages, both drugs are absorbed into the circulation at identical amounts. Thus, because they have the same absorption rates, they are:
   a. Bioavailable.
   b. Synergistic.
   c. Compatible.
   d. Bioequivalent.

   ANS: D
   Two drugs absorbed into the circulation at the same amount (in specific dosage forms) have the same bioavailability; thus, they are bioequivalent. Option A is incorrect because "bioavailability" is the term used to express the extent of drug absorption. Option B is incorrect because the term "synergistic" refers to two drugs, given together, with the resulting effect that is greater than the sum of the effects of each drug given alone. Option C is incorrect because the term "compatible" is a general term that indicates that two substances do not have a chemical reaction when mixed (or given, in the case of drugs) together.

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2. When giving an intravenous medication, the patient asks the nurse why the medication has to be given "through my arm. I usually take pills." The nurse's best answer would be:
   a. "The medication will cause fewer adverse effects when given intravenously."
   b. "The IV medication will be absorbed slowly into the tissues over time."
   c. "The medication's action will begin faster when given intravenously."
   d. "There is a lower chance of allergic reactions when drugs are given IV."

   ANS: C
   The intravenous injection is the fastest route of absorption. Option A is incorrect because the route does not affect the number of adverse effects. Option B is incorrect because the intravenous route is the fastest route of absorption. Option D is incorrect because the route does not affect the number of allergic reactions.

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3. Which of the following 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 altered by the presence of food in the stomach.
   d. Parenteral drugs exert their effects while circulating in the bloodstream.

ANS: A
Drugs given by the parenteral route bypass the first-pass effect. Options B and C apply to enteral drugs (taken orally), not parenteral drugs. Option D is incorrect because parenteral drugs must be absorbed into cells and tissues from the circulation before they can exert their effects.

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4. When monitoring a patient on an insulin drip to reduce blood glucose levels, the nurse notes that the patient's glucose level 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 the drug's normal effects in the body. In this case, the insulin lowered the patient's blood glucose levels too much. Option A is incorrect because a adverse effect is a predictable, well-known adverse drug reaction (ADR) that results in minor or no changes in patient management. Option B is incorrect because an allergic reaction (also known as a *hypersensitivity reaction*) involves the patient's immune system. Option C is incorrect because an idiosyncratic reaction is unexpected, and is defined as a genetically determined abnormal response to normal dosages of a drug.

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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 elicit half 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. Options A, B, and D are not correct definitions of half-life.

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6. When administering drugs, the nurse remembers that duration of action is defined as:
   a. The time it takes for the drug to elicit a therapeutic response.
   b. The time it takes a drug to reach its maximum therapeutic response.

c. The length of time it takes to remove a drug from circulation.
d. The length of time that the drug 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. Option A is the definition of a drug's "onset of action." Option B is the definition of a drug's "peak effect." Option C addresses a drug's elimination and does not define duration of action correctly.

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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. Is attracted to a receptor on the cell wall, preventing an enzyme from binding to that receptor.
   c. Enhances its effectiveness within the cell walls of the target tissue.
   d. Attracts enzymes to bind with it instead of the enzymes' normal target cells, thus blocking the action of the enzymes.

   ANS: D
   With selective enzyme interaction, the drug attracts the enzymes to bind with the drug instead of the enzymes binding 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. Options A, B, and C do not occur with selective enzyme interactions.

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8. When administering a new medication to the patient, the nurse reads that it is highly protein-bound. The nurse should expect that:
   a. Renal excretion will take longer.
   b. The drug will be metabolized quickly.
   c. The duration of action of the medication will be longer.
   d. The duration of action of the medication will be shorter.

   ANS: C
   Drugs that are bound to plasma proteins are characterized by longer duration of action. Option A is not correct because protein binding does not make renal excretion longer. Option B is incorrect because protein binding does not increase metabolism of the drug. Option D is incorrect because protein binding of a drug means that the duration of action is longer, not shorter.

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   TOP: NURSING PROCESS: Planning
   MSC: NCLEX: Physiological Integrity: Pharmacological Therapies

9. A patient is experiencing chest pain and needs to take a sublingual form of nitroglycerin. The nurse would instruct the patient to place the tablet:
   a. Under the tongue.
   b. In the space between the cheek and the gum inside the mouth.
   c. At the back of the throat for easy swallowing.
   d. On a non-hairy area on the chest.

   ANS: A
   The sublingual route is located under the tongue. Option B describes the buccal route. Option C is the oral route. Option D is the topical or transdermal route.

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   TOP: NURSING PROCESS: Implementation
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10. The nurse is administering medications to a patient who is in liver failure due to 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 will most affect a drug's metabolism. The absorption of a drug, Option A, is not affected by liver function. Option B, distribution, is not affected by liver function. Option D, excretion, is affected only because decreased liver function may not transform drugs into water-soluble substances for elimination via the kidneys, but it is not the best answer for this question.

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    TOP: NURSING PROCESS: Assessment
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MULTIPLE RESPONSE

1. Of the drugs listed below, which would be affected by the first-pass effect? *Select all that apply.*
   a. Morphine infusion through a patient-controlled analgesia pump
   b. nitroglycerin sublingual tablets
   c. diphenhydramine (Benadryl) elixir
   d. levothyroxine (Synthroid) tablets
   e. transdermal nicotine patches
   f. nifedipine (Procardia) capsules
   g. Penicillin given by IV piggyback infusion

   ANS: C, D, F

Orally administered drugs undergo the first-pass effect because they are metabolized in the liver after being absorbed into the portal circulation from the small intestine. Options A, B, E, and G enter the bloodstream directly and do not go directly to the liver.

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