1. Which cellular structure stores hormones and other substances and packages these substances into secretory granules?
   A) Golgi apparatus
   B) Endoplasmic reticulum
   C) Mitochondria
   D) Lysosome
   Ans: A
   Feedback:
   The golgi apparatus stores hormones and other substances. The endoplasmic reticulum contains ribosomes, which synthesize proteins, including enzymes that synthesize glycogen, triglycerides, and steroids and those that metabolize drugs and other chemicals. The mitochondria generate energy for cellular activities and require oxygen. Lysosomes are membrane-enclosed vesicles that contain enzymes capable of digesting nutrients (proteins, carbohydrates, fats), damaged cellular structures, foreign substances (bacteria), and the cell itself.

2. A patient is suffering from a cough associated with an upper respiratory infection. Which oral medication will likely produce the most therapeutic effect?
   A) A tablet
   B) An expectorant
   C) A topical spray
   D) A timed-release tablet
   Ans: B
   Feedback:
   Liquid medications are absorbed faster than tablets or capsules. Expectorants are liquid medications. A tablet is an oral medication that has a slower onset of action than a liquid medication. A topical spray can be sprayed to the back of the throat and provides only a local effect. A timed-release tablet is an oral medication that has a slower onset and longer duration of action.

3. A patient is administered an oral contraceptive. Which of the following is the process that occurs between the time the drug enters the body and the time that it enters the bloodstream?
   A) Absorption
   B) Distribution
   C) Metabolism
   D) Excretion
   Ans: A
   Feedback:
   Absorption is the process that occurs from the time the drug enters the body to the time it enters the bloodstream to be circulated. Distribution involves the transport of drug molecules within the body. Metabolism is the method by which drugs are inactivated or biotransformed by the body. Excretion refers to elimination of a drug from the body.

4. Which of the following sites of drug absorption is considered to have an exceptionally large surface area for drug absorption?
   A) Rectum
   B) Fundus of the stomach
   C) Esophagus
   D) Lungs
   Ans: D
   Feedback:
   The lungs have a large surface area for absorption of anesthetic gases and a few other drugs. The rectum absorbs the medication through the mucous membranes and has a smaller surface area than the lungs. The fundus and esophagus have comparatively small surface areas.

5. A nurse is aware of the importance of adhering to the intended route of a medication. Which of the following drugs are formulated to be absorbed through the skin?
   A) Amoxicillin, tetracycline, and penicillin
   B) Clonidine, fentanyl, and nitroglycerin
   C) Digoxin, lidocaine, and propranolol
   D) Insulin, heparin, and morphine
   Ans: B
   Feedback:
   Some drugs are formulated in adhesive skin patches for absorption through the skin. Clonidine, fentanyl, and nitroglycerin are examples of drugs that are formulated in adhesive skin patch form to be absorbed through the skin. Amoxicillin, tetracycline, and penicillin are administered orally. Digoxin and propranolol are administered orally, and lidocaine can be administered intravenously, subcutaneously, or topically. Insulin and heparin are administered intravenously and subcutaneously. Morphine is administered orally, intramuscularly, and intravenously.

6. An 85-year-old patient has an elevated serum creatinine level, indicating impaired kidney function. When the patient is administered a medication, this patient is at risk for which of the following medication-related effects?
   A) Toxicity
   B) Increased absorption
   C) Delayed gastric emptying
   D) Idiosyncratic effects
   Ans: A
   Feedback:
   An elevated creatinine level is indicative of diminished kidney function, which will result in serum drug toxicity. The creatinine level indicates kidney function, does not affect absorption, and has no effect on gastric emptying.

7. Protein binding is an important aspect of pharmacokinetics. Protein binding ultimately has which of the following effects on drug action?
   A) Increases the drug's speed of action
   B) Decreases the drug's speed of action
   C) Increases the rate of excretion
   D) Averts adverse effects
   Ans: B
   Feedback:
   Protein binding allows part of a drug to be stored and released as needed. Drugs that are highly bound to plasma proteins or stored extensively in other tissues have a long duration of action. Protein binding does not increase the speed of action, increase the excretion rate, or avert adverse effects. Protein binding decreases the speed of action by storing the drug to be released when needed.

8. A patient is taking a medication that is metabolized by the CYP enzymes. Which of the following medications inhibits several of the CYP enzymes?
   A) Cisplatin
   B) Acebutolol hydrochloride
   C) Cimetidine
   D) Dicloxacillin sodium
   Ans: C
   Feedback:
   Cimetidine is a gastric acid suppressor that inhibits several CYP enzymes and can greatly decrease drug metabolism. The other listed drugs do not have this specific effect.

9. A nurse is aware that the dosing scheduling of a patient's new medication takes into account the serum half-life of the drug. What is the serum half-life of a medication?
   A) The time required for IV medications to penetrate the brain tissue
   B) The time needed for the serum level to fall by 50%
   C) The safest margin to prevent toxicity
   D) The dose adjustment that reduces the risk of adverse effects by one half
   Ans: B
   Feedback:
   Serum half-life is the time required for the serum concentration of a drug to decrease by 50%. Although many IV medications penetrate the brain tissue, this action does not describe the half-life. The safest margin to prevent toxicity depends on the rate of metabolism and excretion. The half-life of the medication does not relate directly to a specific reduction in adverse effects.

10. A patient has increased intracranial pressure and is ordered to receive a diuretic. Which of the following diuretics does not act on receptor sites to produce diuresis?
    A) Furosemide (Lasix)
    B) Hydrochlorothiazide (HCTZ)
    C) Spironolactone (Aldactone)
    D) Mannitol (Osmitrol)
    Ans: D
    Feedback:
    Mannitol (Osmitrol) is an osmotic diuretic that increases the osmolarity of plasma and pulls water out of the tissues into the bloodstream. It does not act on receptor sites. Furosemide (Lasix) is a loop diuretic that inhibits the reabsorption of sodium and chloride in the loop of Henle. Hydrochlorothiazide is associated with drug interference with absorption of sodium ions across the distal renal tubule. Spironolactone acts by competing with aldosterone for cellular receptor sites.

11. A patient older than 65 years is more likely to experience drug reaction than a much younger patient. Which of the following factors accounts for this variation?
    A) Drugs more readily crossing the blood–brain barrier in older people
    B) Age-related physiologic changes
    C) Increased drug-metabolizing enzymes in older people
    D) Diminished immune response
    Ans: B
    Feedback:
    In older adults (65 years and older), physiologic changes may alter all pharmacokinetic processes. Although drugs crossing the blood–brain barrier affect drug reaction, this factor is important in all ages. Increased drug-metabolizing enzymes are key in all ages and do not relate to age variations. A diminished immune response is important in all ages and does not affect all medications.

12. A patient who is 6 feet tall and weighs 280 pounds will require which of the following doses?
    A) Higher dose than a patient who weighs 180 pounds
    B) Lower dose than a patient who weighs 180 pounds
    C) Same dose as a patient who weighs 180 pounds
    D) A parenteral rather than oral dose
    Ans: A
    Feedback:
    In general, people heavier than average may need larger doses, provided their renal, hepatic, and cardiovascular functions are adequate.

13. A nurse has provided an oral dose of morphine, an opioid agonist, to a woman in early labor. The nurse should be aware of what characteristic of agonists?
    A) Agonists alter the normal processes of distribution and metabolism.
    B) Agonists counteract the action of specific neurotransmitters.
    C) Agonists block the action of specific neurotransmitters.
    D) Agonists bind to receptors and cause a physiological effect.
    Ans: D
    Feedback:
    Agonists are drugs that produce effects similar to those produced by naturally occurring hormones, neurotransmitters, and other substances by activating (not blocking or counteracting) a receptor. Classification of a drug as an agonist does not denote a change to metabolism or distribution.

14. A nurse is preparing to simultaneously administer two drugs to a patient. The nurse knows that the drugs have been ordered to be given together because of their synergistic effect. This means that
    A) the adverse effects of one of the drugs are nullified by the other drug.
    B) the combined effects are greater than the effects of either one of the drugs alone.
    C) one of the drugs enhances metabolism, while the other drug enhances either distribution or absorption.
    D) both drugs are toxic in isolation but therapeutic when administered together.
    Ans: B
    Feedback:
    Synergism occurs when two drugs with different sites or mechanisms of action produce greater effects when taken together. This does not mean that potential toxicity or adverse effects are "canceled out." The two drugs would not individually affect different aspects of pharmacokinetics.

15. A patient has been brought to the emergency department by ambulance, and his friend states that he has overdosed on methadone, a long-acting opioid. The care team is preparing to administer the appropriate antidote, naloxone, which has a shorter half-life than methadone. What are the implications of this aspect of pharmacokinetics?
    A) Repeated doses of naloxone will likely be necessary.
    B) A different antidote will be required after the serum level of naloxone decreases.
    C) An increased dose of naloxone will be required.
    D) The antidote is unlikely to have a therapeutic effect on the patient's symptoms.
    Ans: A
    Feedback:
    When an antidote is used, its half-life relative to the toxin's half-life must be considered. For example, the half-life of naloxone, a narcotic antagonist, is relatively short compared with the half-life of the longer-acting opioids such as methadone, and repeated doses may be needed to prevent recurrence of the toxic state.

16. A patient tells the nurse, "I took my sleeping pill yesterday evening, but it didn't seem to work for me like it usually does." The nurse should consider which of the following variables that can affect drug absorption? Select all that apply.
    A) GI function
    B) Blood flow to the site of administration
    C) The presence of other drugs
    D) Route of administration
    E) The presence of receptor agonists
    Ans: A, B, C, D
    Feedback:
    Numerous factors affect the rate and extent of drug absorption, including dosage form, route of administration, blood flow to the site of administration, GI function, the presence of food or other drugs, and other variables. Agonist activity is a relevant variable, but this is not an aspect of absorption.

17. A nurse has administered a dose of a drug that is known to be highly protein bound. What are the implications of this characteristic?
    A) The patient must consume adequate protein in order to achieve a therapeutic effect.
    B) The molecules of the drug that are bound to protein are inactive.
    C) Increased levels of serum protein will increase the effect of the drug.
    D) Each molecule of the drug must bind to a protein molecule to become effective.
    Ans: B
    Feedback:
    Drug molecules bound to plasma proteins are pharmacologically inactive because the large size of the complex prevents their leaving the bloodstream through the small openings in capillary walls and reaching their sites of action, metabolism, and excretion. Only the free or unbound portion of a drug acts on body cells. The patient's protein intake or levels of protein are not normally relevant.

18. A patient requires a high dose of his new antihypertensive medication because the new medication has a significant first-pass effect. This means that the drug
    A) must pass through the patient's bloodstream several times to generate a therapeutic effect.
    B) passes through the renal tubules and is excreted in large amounts.
    C) is extensively metabolized in the patient's liver.
    D) is ineffective following the first dose and increasingly effective with each subsequent dose.

    Ans: C

    Feedback:

    Some drugs are extensively metabolized in the liver, with only part of a drug dose reaching the systemic circulation for distribution to sites of action. This is called the first-pass effect or presystemic metabolism. The first-pass effect is not related to renal function or the need to pass through the bloodstream multiple times.

19. A patient with a diagnosis of bipolar disorder has begun lithium therapy, and the nurse has explained the need for regular monitoring of the patient's serum drug levels. What is the primary rationale for the nurse's instruction?
    A) It is necessary to regularly test for blood–drug incompatibilities that may develop during treatment.
    B) It is necessary to ensure that the patient's drug levels are therapeutic but not toxic.
    C) It is needed to determine if additional medications will be needed to potentiate the effects of lithium.
    D) It is needed in order to confirm the patient's adherence to the drug regimen.

    Ans: B

    Feedback:

    Measuring serum drug levels is useful when drugs with a narrow margin of safety are given, because their therapeutic doses are close to their toxic doses. This is the case during lithium therapy. Serum levels are not commonly taken to monitor adherence to treatment. Blood–drug incompatibilities are not a relevant consideration.

20. A patient in cardiovascular collapse requires pharmacological interventions involving a rapid drug action and response. What route of administration is most likely appropriate?
    A) Intravenous
    B) Oral
    C) Rectal
    D) Topical

    Ans: A

    Feedback:

    For rapid drug action and response, the IV route is most effective because the drug is injected directly into the bloodstream.