Chapter 2: Principles of Pharmacology
Test Bank

MULTIPLE CHOICE

1. The pharmacokinetic phases control the _____ of the drug's effect and the _____ of the drug action.
   a. intensity, duration
   b. duration, effect
   c. mechanism, safety
   d. length, efficacy

   ANS: A
   These pharmacokinetic phases control the intensity of the drug's effect and the duration of the drug action.

   DIF: Cognitive level 2: Comprehension REF: p. 23

2. The time it takes for a drug to reach the concentration necessary to produce a therapeutic effect is called the _____ of action.
   a. duration
   b. mechanism
   c. onset
   d. length

   ANS: C
   The time it takes for a drug to reach the concentration necessary to produce a therapeutic effect is called the onset of action.

   DIF: Cognitive level 1: Recall REF: p. 23

3. Duration of action is the time between the _____ of action and _____ of drug action.
   a. mechanism, duration
   b. onset, discontinuation
   c. duration, concentration
   d. onset, mechanism

   ANS: B
   Duration of action is the time between the onset of action and discontinuation of drug action.

   DIF: Cognitive level 1: Recall REF: p. 23

4. Which of the following factors will determine how quickly or slowly a drug is absorbed?
   a. Ionization of the drug
   b. Kidney disease
   c. Half-life of the drug
   d. Drug dosage form

   ANS: D

How quickly or slowly a drug is absorbed is determined by the characteristics of the drug, drug dosage form, route of administration, and human anatomy and physiology. All other factors listed are factors influencing elimination of a drug.

DIF: Cognitive level 2: Comprehension REF: p. 23

5. Which of the following doses has 100% bioavailability?
   a. 1 mL PO
   b. 2 mL IV
   c. 1 tablet PO
   d. 1 supp pr

   ANS: B
   Drugs that are administered intravenously are completely absorbed into the bloodstream if they are injected directly into the vein.

   DIF: Cognitive level 3: Application REF: p. 23| p. 27

6. The ability of a drug to diffuse across the cell membrane is dependent upon _____ of the drug and the _____ of the body fluid in which it is dissolved.
   a. properties, actions
   b. pH, actions
   c. properties, pH
   d. strength, health

   ANS: C
   The ability of a drug to diffuse across the cell membrane is dependent upon properties of the drug and the pH of the body fluid in which it is dissolved.

   DIF: Cognitive level 1: Recall REF: p. 27

7. What could be done to increase absorption of an intramuscular injection?
   a. Cry because the injection hurt.
   b. Apply a cold pack.
   c. Take a nap.
   d. Exercise the muscle.

   ANS: D
   Absorption of drugs that are injected intramuscularly or subcutaneously is enhanced when the patient applies heat to the muscle, exercises, or does some other activity to stimulate blood flow to the site of administration.

   DIF: Cognitive level 3: Application REF: p. 27

8. What would be a benefit to a drug that is hydrophobic and nonionized?
   a. The drug would cause fewer side effects.
   b. The drug would easily be metabolized by the body.
   c. The drug would easily be distributed throughout the body.
   d. There would be no benefit.

   ANS: C

Distribution of the drug across the cell membrane of the blood vessel and transport to its site of action is influenced by the chemical nature of the drug. The drug must be hydrophobic, lipid soluble, nonionized, or small enough to pass through slit junctions in the capillary wall.

DIF: Cognitive level 4: Analysis REF: p. 30

9. What would be the potential result of dispensing two drugs that are both weak acids and are hydrophobic?
   a. Easy elimination of each drug because they are hydrophobic
   b. Drug interaction
   c. Easy ionization of each drug
   d. Drug hypersensitivity

   ANS: B
   Albumin has the greatest affinity for weak acids and hydrophobic drugs. Competitive protein binding represents a mechanism for drug interactions.

   DIF: Cognitive level 4: Analysis REF: p. 30

10. Which of the following allows for the greatest absorption of an orally administered drug?
    a. Small intestine
    b. Large intestine
    c. Liver
    d. Pancreas

    ANS: A
    Absorption of orally administered drugs is greatest in the small intestine.

    DIF: Cognitive level 2: Comprehension REF: p. 27

11. Distribution of the drug across the cell membrane of the blood vessel and transport to its site of action is influenced by the _____ nature of the drug.
    a. physical
    b. mechanical
    c. chemical
    d. ionic

    ANS: C
    Distribution of the drug across the cell membrane of the blood vessel and transport to its site of action is influenced by the chemical nature of the drug.

    DIF: Cognitive level 2: Comprehension REF: p. 30

12. Which of the following is *not* a major site of drug elimination?
    a. Lungs
    b. Kidney
    c. Liver
    d. Bowel

    ANS: C
    The three major routes of drug elimination are the kidney, lung, and bowel. The liver, skin, eyes, mouth, nose, penis, and breast are minor routes (Table 2-3).

DIF: Cognitive level 2: Comprehension REF: p. 35

13. _____ are drugs that are administered in an inactive form and must be metabolized to their active form.
    a. Metabolites
    b. Prodrugs
    c. Lipophilics
    d. Hydrophobics

    ANS: B
    Prodrugs are drugs that are administered in an inactive form and must be metabolized to their active form.

    DIF: Cognitive level 1: Recall REF: p. 33

14. _____ and _____ require lower doses of drug to produce therapeutic effects.
    a. Infants, the elderly
    b. Teenagers, the elderly
    c. Children, adults
    d. Infants, children

    ANS: A
    Infants and the elderly require lower doses of drug to produce therapeutic effects.

    DIF: Cognitive level 2: Comprehension REF: p. 34

15. Of the following doses, which would have a longer half-life?
    a. One tablet every day
    b. One tablet twice daily
    c. One tablet three times a day
    d. One tablet four times a day

    ANS: A
    Drugs with a long half-life are dosed less frequently than are drugs with a very short half-life.

    DIF: Cognitive level 3: Application REF: p. 37

16. What could be a benefit of a nonionized drug when being eliminated?
    a. The liver would not be able to release the necessary metabolizing enzymes.
    b. It would be reabsorbed into circulation to prolong its effects.
    c. It would be easily eliminated from circulation through the urine.
    d. It would not be subject to the “first-pass effect.”

    ANS: B
    Changes in the acidity of the urine can influence the rate in which a drug is cleared from the body. Drugs that are ionized are eliminated in the urine. Nonionized drugs are reabsorbed into the circulatory system to continue their drug action.

    DIF: Cognitive level 4: Analysis REF: p. 36

17. If a prescriber wanted a basic drug to not easily be eliminated from circulation, he or she could prescribe which of the following concurrently?
    a. Sodium bicarbonate
    b. Sodium chloride
    c. Vitamin C
    d. Vitamin B_3

    ANS: A
    Urinary alkalinizers (e.g., sodium bicarbonate) decrease the elimination of basic drugs.

    DIF: Cognitive level 3: Application REF: p. 36

18. Why is the route of administration important to the "first-pass effect"?
    a. The route can help determine if the drug is being taken as prescribed and therefore is overcoming the first-pass effect.
    b. A drug can be significantly reduced to its inactive metabolite before first entering circulation when administered orally.
    c. Drugs administered parenterally are highly subject to the first-pass effect and should therefore be dosed accordingly.
    d. Bioavailability of drug can be greatly reduced when the drug is administered by a route other than orally.

    ANS: B
    Orally administered drugs must pass into hepatoportal circulation (liver) before entering into the general circulation. The *first-pass effect* describes a process whereby the liver metabolizes nearly all of a drug to an inactive metabolite before it passes into the general circulation.

    DIF: Cognitive level 4: Analysis REF: p. 33

19. Which of the following would be classified as pharmaceutical alternatives for Procardia (nifedipine)?
    a. Procardia 10-mg capsules vs. nifedipine 10-mg capsules
    b. Nifedipine 20-mg gel capsules vs. Procardia 20-mg gel capsules
    c. Procardia 10-mg capsules vs. Procardia XL 30-mg tablets
    d. Nifedipine XL 30-mg capsules vs. Procardia XL 30-mg capsules

    ANS: C
    Pharmaceutical alternatives contain the same active ingredient as the brand name product; however, the strength and dosage form may be different.

    DIF: Cognitive level 2: Comprehension REF: p. 37

20. Why would the warning label "Do not take with grapefruit juice" need to be added to a prescription for lovastatin?
    a. The drug should be taken on an empty stomach.
    b. The drug effect would be increased as a result of inhibition of necessary metabolic enzymes.
    c. The drug effect would be decreased as a result of an increased release of metabolic enzymes.
    d. The drug is not able to produce its effects because the juice inactivates it.

    ANS: B

Grapefruit juice is an inhibitor of the metabolic enzyme CYP3A4. When drugs that have a CYP3A4 substrate, such as the anticholesterol drug lovastatin and the antiretroviral drug saquinavir, are taken with grapefruit juice, metabolism is reduced and blood levels of the drugs are increased along with drug effects.

DIF: Cognitive level 4: Analysis REF: pp. 34-35

21. Using the following table, determine what the drug concentration (X) would be 40 hours after peak concentration.

Different perspectives	**Changing values**					
Drug concentration (mg/L)	100	50	25	12.5	6.2	**X**
Hours after peak concentration	0	8	16	24	32	40
Number of half-lives	0	1	2	3	4	5
Percentage of drug removed	0	50	75	88	94	97

a. 0
b. 2.08
c. 3.125
d. 4.17

ANS: C
Table referenced is Table 2-4 in the text. Elimination half-life ($t_{1/2}$) refers to the time it takes for 50% of the drug to be cleared from the bloodstream (Table 2-4). It takes approximately eight half-lives to eliminate a drug entirely from the body.

DIF: Cognitive level 3: Application REF: p. 37

MATCHING

Match each of the following pregnancy categories with its proper description.

a. Category A
b. Category B
c. Category C
d. Category D
e. Category X

1. Studies indicate no risk to animal fetus; information in humans is not available.
2. Fetal abnormalities reported and positive evidence of fetal risk in humans are available from animal and/or human studies. These drugs should not be used in pregnant women.
3. Human studies indicate no risk to the fetus.
4. Possible fetal risk in humans has been reported; however, considering potential benefit versus risk may, in selected cases, warrant the use of these drugs in pregnant women.
5. Adverse effects reported in animal fetus; information in humans is not available.

1. ANS: B DIF: Cognitive level 1: Recall REF: p. 31
   MSC: See Table 2-1 for a list of pregnancy categories.
2. ANS: E DIF: Cognitive level 1: Recall REF: p. 31
   MSC: See Table 2-1 for a list of pregnancy categories.
3. ANS: A DIF: Cognitive level 1: Recall REF: p. 31
   MSC: See Table 2-1 for a list of pregnancy categories.

4. ANS: D DIF: Cognitive level 1: Recall REF: p. 31
   MSC: See Table 2-1 for a list of pregnancy categories.
5. ANS: C DIF: Cognitive level 1: Recall REF: p. 31
   MSC: See Table 2-1 for a list of pregnancy categories.

TRUE/FALSE

1. The body has to metabolize most drugs before they are eliminated.

   ANS: T
   The body metabolizes the drug, and then it is eliminated.

   DIF: Cognitive level 1: Recall REF: p. 23

2. Drugs that are administered subcutaneously are completely absorbed into the bloodstream if they are injected directly into the vein.

   ANS: F
   Drugs that are administered *intravenously* are completely absorbed into the bloodstream if they are injected directly into the vein.

   DIF: Cognitive level 1: Recall REF: p. 23| p. 27

3. A drug that is highly lipophilic will have difficulty moving across a membrane.

   ANS: F
   A lipid-soluble drug can move easily across the cell membrane.

   DIF: Cognitive level 1: Recall REF: p. 26

4. Passive transport takes energy and requires special carrier proteins or pumps so that the drug can be carried across the cell membrane.

   ANS: F
   Active transport takes energy and requires special carrier proteins or pumps to “carry the drug” across the cell membrane.

   DIF: Cognitive level 1: Recall REF: p. 26

5. Absorption is greatest when the body has a good blood supply in the area where the drug is to be absorbed.

   ANS: T
   Absorption is greatest in areas of the body that have good blood supply.

   DIF: Cognitive level 1: Recall REF: p. 27