Pharmacrystal

Pharmacology

Question Bank

Introduction to Pharmacology:

Basic Principles

1) Which of the following is NOT part of the etymology of the word pharmacology?
   a) Medicine
   b) Drug
   c) Herb
   d) Poison
   e) Study

2.1) Which of the following describes an agonist?
   a) Any substance that brings about a change in biologic function through its chemical action
   b) A specific regulatory molecule in the biologic system where a drug interacts
   c) A drug that binds to a receptor and stimulates cellular activity
   d) A drug that binds to a receptor and inhibits or opposes cellular activity
   e) A drug directed at parasites infecting the patient

2.2) Xenobiotics are considered:
   a) Endogenous
   b) Exogenous
   c) Inorganic poisons
   d) Toxins
   e) Ligands

2.3) Which of the following would be a toxin (poison of biological origin)?
   a) Pb
   b) As
   c) Hg
   d) Atropine

2.4) The vast majority of drugs have molecular weights (MW) between 100 and 1,000. Large drugs, such as alteplase (t-PA), must be administered:
   a) Into the compartment where they have their effect
   b) Orally so they do not absorb too quickly
   c) Rectally to prevent irritation to the stomach lining and vessels
   d) Via the intraosseous (IO) route
   e) Titrated with buffering agents to prevents cell lysis

2.5) Which of the following occurs with drugs that are extremely small, such as Lithium?
   a) Receptor mediated endocytosis
   b) Minor drug movement within the body
   c) Vasodilation when injected intravenously (IV)
   d) Specific receptor binding
   e) Nonspecific binding

2.6) Drugs fit receptors using the lock and key model. Covalent bonds are the ____ and the ____ specific.
   a) Strongest; Most
   b) Strongest; Least
   c) Weakest; Most
   d) Weakest; Least

2.7) Warfarin (Coumadin) is given as a racemic mixture with the S enantiomer being four times more active than the R enantiomer. If the mixture of Warfarin given is 50% S and

50% R, what is the potency compared with a 100% R enantiomer solution?

a) 4 * R + 1 * S = 1
b) 4 * R + 1 * S = 1.5
c) 4 * R + 1 * S = 2
d) 4 * R + 1 * S = 2.5
e) 4 * R + 1 * S = 4

2.8) What determines the degree of movement of a drug between body compartments?

a) Partition constant
b) Degree of ionization
c) pH
d) Size
e) All of the above

3.1) Which of the following is NOT a protein target for drug binding?

a) Side of action (transport)
b) Enzymes
c) Carrier molecules
d) Receptors
e) Ion channels

3.2) Which of the following is an example of a drug acting directly through receptors?

a) Protamine binds stoichiometrically to heparin anticoagulants
b) Adrenergic beta blockers for thyroid hormone-induced tachycardia
c) Epinephrine for increasing heart rate and blood pressure
d) Cancer chemotherapeutic agents
e) Mannitol for subarachnoid hemmorhage

4.1) What is added with drug subclassification, such as an antitubercular drug versus an antibacterial drug?

a) Cost
b) Size
c) Ionization
d) Precision
e) Speed

4.2) What type of drug is propranolol (Inderal)?

a) Anticonvulsive
b) Antihypertensive
c) Antinauseant
d) Antihistamine
e) Antipyretic

5.1) Which of the following is considered the brand name?

a) Propranolol
b) Inderal
c) Adrenergic ß-blocker
d) “off label” use
e) Blocks ß-receptors in heart myocardium

5.2) Which of the following is considered the class?

a) Propranolol
b) Inderal
c) Adrenergic ß-blocker
d) “off label” use
e) Blocks ß-receptors in heart myocardium

5.3) Which of the following cases would be contraindicated for propranolol (Inderal)?

a) Hypertension
b) Essential tremor
c) Angina

d) Tachycardia
e) Asthma

5.4) Which of the following adverse effects (side-effects) is NOT commonly seen with cholinergic antagonists?

a) Blurred vision
b) Confusion
c) Miosis
d) Constipation
e) Urinary retention

6.1) The drug chloramphenicol (Chloromycetin) is risky for which of the following?

a) Neonates
b) Geriatric patients
c) Adult males
d) Obese patients
e) Congestive heart failure patients

6.2) How does the glomerular filtration rate (GFR) change after the age of 40?

a) Increase 1% each year
b) Increases 2% each year
c) Decreases 1% each year
d) Decreases 2% each year
e) Does not depend on age

6.3) A decrease in renal and liver function, as seen in the elderly, would prolong drug half-life, ____ plasma protein binding, and ____ volume of distribution.

a) Increase; Increase
b) Decrease; Decrease
c) Increase; Decrease
d) Decrease; Increase

6.4) When prescribing isoniazid (Rimifon), pharmacogenetics must be considered as >90% of Asians and certain other groups are ____ acetylators, and thus have a ____ blood concentration of a given dose and a decreased risk of toxicity.

a) Slow; Increased
b) Slow; Decreased
c) Fast; Increased
d) Fast; Decrease

6.5) Which of the following are the two modifying factors that contribute to why women have higher blood peak concentrations of alcohol than men when consuming equivalent amounts?

a) Lower blood volume & increased hormones
b) Lower fat content & more gastric alcohol dehydrogenase (ADH)
c) Higher fat content & more gastric alcohol dehydrogenase (ADH)
d) Lower fat content & less gastric alcohol dehydrogenase (ADH)
e) Higher fat content & less gastric alcohol dehydrogenase (ADH)

Pharmacokinetic Principles:

Drug Movement

1) Pharmacokinetics is the effect of the ____ and pharmacodynamics is the effect of the ____.
a) Drug on a drug; Body on the drug
b) Body on the drug; Drug on a drug
c) Drug on the body; Body on the drug
d) Body on the drug; Drug on the body
e) Drug on a drug; Drug on a drug

2.1) Which of the following is NOT an action of the body on a drug?
a) Absorption
b) Distribution
c) Metabolism
d) Excretion
e) Side effects

3) If a drug is 80% bound to blood elements or plasma proteins, what part is considered the free form?
a) 20%
b) 40%
c) 50%
d) 80%
e) 100%

4.1) Which of the following describes minimal effective concentration (MEC)?
a) The minimal drug plasma concentration that can be detected
b) The minimal drug plasma concentration to enter tissues
c) The minimal drug plasma concentration to interact with receptors
d) The minimal drug plasma concentration to produce effect
e) The minimal drug plasma concentration to reach therapeutic levels

4.2) If a patient misses three doses of their daily drug, which of the following (in general) is the best solution?
a) Take a 4x dose at the next dose time
b) Wait 3 more days (week total) then return to normal regimen
c) Do nothing and continue normal regimen
d) Setup an appointment to have the patient evaluated
e) Prescribe a higher dosage pill so missed doses will have less effect

4.3) Blood levels of a drug correlate to the effectiveness of that drug, such as with pentazocine (Talwin) or phenobarbitol (Luminal).
a) True
b) False

5.1) Which of the following drug permeation mechanisms involves polar substances too large to enter cells by other means, such as iron or vitamin B12?
a) Aqueous diffusion
b) Lipid diffusion
c) Carrier molecules
d) Endocytosis and exocytosis

5.2) Which of the following drug permeation mechanisms occurs across epithelial tight junctions and is driven by a concentration gradient?
a) Aqueous diffusion

b) Lipid diffusion
c) Carrier molecules
d) Endocytosis and exocytosis

5.3) Which of the following drug permeation mechanisms uses the Henderson-Hasselbalch equation for the ratio of solubility for the weak acid or weak base?
a) Aqueous diffusion
b) Lipid diffusion
c) Carrier molecules
d) Endocytosis and exocytosis

5.4) Which of the following drug permeation mechanisms is used for peptides, amino acids, glucose, and other large or insoluble molecules?
a) Aqueous diffusion
b) Lipid diffusion
c) Carrier molecules
d) Endocytosis and exocytosis

5.5) Which of the following drug permeation mechanisms uses caveolae?
a) Aqueous diffusion
b) Lipid diffusion
c) Carrier molecules
d) Endocytosis and exocytosis

6.1) Using the Fick Law of Diffusion, how will flux change if membrane thickness is doubled?
a) It will double
b) It will quadruple
c) It will halve
d) It will quarter
e) It will not change

6.2) Using the Fick Law of Diffusion, how will flux change if the permeability coefficient is quadrupled?
a) It will double
b) It will quadruple
c) It will halve
d) It will quarter
e) It will not change

7.1) Which of the following is the amount of a drug absorbed per the amount administered?
a) Bioavailability
b) Bioequivalence
c) Drug absorption
d) Bioinequivalence
e) Dosage

7.2) Which of the following is NOT needed for drug bioequivalence?
a) Same active ingredients
b) Same strength or concentration
c) Same dosage form
d) Same route of administration
e) Same side effects

7.3) For intravenous (IV) dosages, what is the bioavailability assumed to be?
a) 0%
b) 25%
c) 50%
d) 75%
e) 100%

7.4) Although morphine (Avinza, Oramorph SR, MS Contin) is well-absorbed when administered orally (PO), how much of the drug is metabolized on its first pass through the liver?

a) 90%
b) 70%
c) 50%
d) 30%
e) 10%

7.5) For a generic drug to be bioequivalent to an innovator drug (per FDA), it must be measured in ____ of subjects to fall within ____ of the mean of the test population bioavailability.

a) 50; 50
b) 80; 20
c) 20; 80
d) 95; 5
e) 5; 95

7.6) Using the FDA bioequivalence rule, how much variation could a generic drug potentially have from an innovator and still be considered equivalent?

a) 100%
b) 20%
c) 40%
d) 60%
e) 80%

8.1) Which of the following is NOT a pharmacokinetic process?

a) Alteration of the drug by liver enzymes
b) Drug metabolites are removed in the urine
c) Movement of drug from the gut into general circulation
d) The drug causes dilation of coronary vessels
e) The drug is readily deposited in fat tissue

8.2) Which of the following can produce a therapeutic response? A drug that is:

a) Bound to plasma albumin
b) Concentrated in the bile
c) Concentrated in the urine
d) Not absorbed from the GI tract
e) Unbound to plasma proteins

8.3) Which of the following most correctly describes steroid hormones with respect to their ability to gain access to intracellular binding sites?

a) They cross the cell membrane via aqueous pores
b) They have a high permeability coefficient
c) They are passively transported via membrane carriers
d) They require vesicular transport
e) Their transport requires the hydrolysis of ATP

Pharmacokinetic Principles: pH and Drug Movement

1) Most drugs are either ____ acids or ____ bases.
a) Strong; Strong
b) Strong; Weak
c) Weak; Weak
d) Weak; Strong

2.1) Aspirin readily donates a proton in aqueous solutions and pyrimethamine readily accepts a proton in aqueous solution. Thus, aspirin is a(b) ____ and pyrimethamine is a(n) ____.
a) Acid; Base
b) Base; Acid
c) Acid; Acid
d) Base; Base

2.2) Given the equilibrium HA <=> A- + H+ (acid) and BH+ <=> B + H+ (base), in an acid environment (low pH) the acid reaction will move to the ____ and the base reaction will move to the ____.
a) Right; Left
b) Right; Right
c) Left; Right
d) Left; Left

3.1) What form of a drug is more lipid-soluble, and thus would remain trapped within a compartment where the pH does not favor the lipid-soluble form?
a) Strong acid (A-)
b) Weak acid (A-)
c) Neutral (AH and B)
d) Weak base (BH+)
e) Strong base (BH+)

3.2) The lipid-soluble form of a base is ____ and the lipid-soluble form of an acid is ____.
a) Protonated; Protonated
b) Protonated; Unprotonated
c) Unprotonated; Unprotonated
d) Unprotonated; Protonated

4.1) If the pKa of Aspirin (acetylsalicylic acid) is 3.5 and the pH of the stomach is 2.5, how much Aspirin is in the protonated species in the stomach and is this the amount available for absorption?
a) ≈ 91%; Yes
b) ≈ 91%; No
c) ≈ 9%; Yes
d) ≈ 9%; No

4.2) What percentage of Aspirin would be ionized in the blood compartment (pH = 7.4) assuming pH is 7.5 and Aspirin pKa is 3.5?
a) (10,000 - 1) / 1 = 99.99%
b) (100 - 1) / 1 = 99%
c) None
d) 1 / (100 - 1) = 0.9%
e) 1 / (10,000 - 1) = 0.009%

4.3) If the pH - pKa = -1, what percentage of weak base is nonionized?
a) 99
b) 90
c) 50
d) 10
e) 1

4.4) If the pH - pka = 2, what percentage of weak acid is nonionized?
a) 99
b) 90
c) 50
d) 10
e) 1

4.5) If pH > pKa, the drug is ____ and if pH < pKa, the drug is ____. An unprotonated acid is ____ and a protonated base is ____.
a) Protonated; Unprotonated; Charged; Charged
b) Protonated; Unprotonated; Neutral; Neutral
c) Unprotonated; Protonated; Charged; Charged
d) Unprotonated; Protonated; Neutral; Charged
e) Unprotonated; Protonated; Charged; Neutral

5.1) Weak acids are excreted faster in ____ urine and weak bases are excreted faster in ____ urine.
a) Acidic; Alkaline
b) Alkaline; Acidic
c) Acidic; Neutral
d) Neutral; Alkaline
e) Alkaline; Neutral

5.2) A patient presents with an overdose of acidic Aspirin. The drug ____ can be given to ____ the pH of the urine and trap the Aspirin, preventing further metabolism.
a) NaHCO3; Increase
b) NaHCO3; Decrease
c) NH4Cl; Increase
d) NH4Cl; Decrease

5.3) A patient presents with an overdose of alkaline Codeine. The drug ____ can be given to ____ the pH of the urine and trap the Codeine, preventing further metabolism.
a) NaHCO3; Increase
b) NaHCO3; Decrease
c) NH4Cl; Increase
d) NH4Cl; Decrease

6.1) The principle of drug manipulation for excretion of a drug out of the renal tubule can be accomplished by:
a) Acidifying the urinary pH
b) Adjusting the urinary pH to protonate weakly acidic drugs
c) Adjusting the urinary pH to unprotonate weakly basic drugs
d) Adjusting the urinary pH to ionize the drug
e) By neutralizing the urinary pH

6.2) Aspirin is a weak organic acid with a pKa of 3.5. What percentage of a given dose will be in the lipid-soluble form at a stomach pH of 1.5?
a) About 1%
b) About 10%
c) About 50%
d) About 90%
e) About 99%

6.3) For which of the following drugs is excretion most significantly accelerated by

acidification of the urine?

a) Weak acid with pKa of 5.5
b) Weak acid with pKa of 3.5
c) Weak base with pKa of 7.5
d) Weak base with pKa of 7.1

6.4) A patient diagnosed with type 2 diabetes is administered an oral dose of 0.1 mg chloropropamide, an insulin secretagogue and weak acid with a pKa of 5.0. What is the amount of this drug that could be absorbed from the stomach at pH 2.0?

a) 99.9 µg
b) 90 µg
c) 50 µg
d) 0.05 mg
e) 0.01 mg

Pharmacokinetic Principles: Absorption

1) Bioavailability (F) is the fraction or percentage of administered drug that reaches the systemic circulation via a given route as compared to what route?
   a) Oral
   b) IV (intravenous)
   c) IO (intraosseous)
   d) CSF (cerebrospinal fluid)
   e) Whatever route attains the target drug concentration in plasma (CT)

2) What organ is responsible for metabolism in the "first pass effect"?
   a) Brain
   b) Heart
   c) Kidney
   d) Liver
   e) Spleen

3.1) A patient is in the hospital and is stable on digoxin 0.175 mg IV qd (daily). How much digoxin in mg. would you need to give your patient orally, given that the bioavailability for oral digoxin tablets is 0.7?
   a) (0.175 * 0.7) / (1.0) = 0.1225 mg
   b) (0.175 * 1) / (0.7) = 0.25 mg
   c) (0.175 + 0.7) / (1.0) = 0.875 mg
   d) (0.175 + 1) / (0.7) = 1.67 mg
   e) No change is necessary

3.2) Given a graph of plasma drug concentration versus time, what part of the graph would be used to calculate bioavailability for a PO (oral) drug administration?
   a) Maximum concentration
   b) Steady concentration
   c) Derivative of the curve (slope)
   d) Integral of the curve (area underneath)
   e) The curve is not used to calculate bioavailability

4.1) Which of the following routes of administration has a bioavailability of about 80-100%, is usually very slow absorbing, and has prolonged duration of action?
   a) IV (intravenous)
   b) IM (intramuscular)
   c) SQ (subcutaneous)
   d) Rectal
   e) Transdermal

4.2) Which of the following routers of administration is the most convenient, although may have a bioavailability anywhere from 5-100%?
   a) PO (oral)
   b) IV (intravenous)
   c) IM (intramuscular)
   d) SQ (subcutaneous)
   e) Transdermal

4.3) Which of the following enteral administration routes has the largest first-pass effect?
   a) SL (sublingual)
   b) Buccal
   c) Rectal
   d) Oral

4.4) Epithelial cells are connected by ____, which are tough to cross and materials often must pass through the cells. Endothelial cells of blood vessels are connected by ____, which proteins cannot cross but smaller drugs (MW 200-500) can.
   a) Macular gap junctions; Tight junctions

b) Tight junctions; Macular gap junctions
c) Adherens junctions; Tight junctions
d) Tight junctions; Adherens junctions
e) Macular gap junctions; Adherens junctions

4.5) Which of the following administration routes is not often used, is painful, and has a risk of infection and adhesion?
a) EPI (epidural)
b) IA (intraarterial)
c) IP (intraperitoneal)
d) IV (intravenous)
e) IO (intraosseous)

4.6) Which of the following is NOT an advantage of prolonged release medications?
a) Less frequent administration
b) Therapeutic effect overnight
c) Lower incidence of side effects
d) Patient compliance
e) More fluctuation in plasma concentration

4.7) What is the common location for the scopolamine motion sickness transdermal patch?
a) Side of the hip
b) Chest
c) Over the deltoid muscle
d) Behind the ear
e) On the back of the neck

Pharmacokinetic Distribution:

Basics

1.1) Which of the following would receive drug slowly?
a) Liver
b) Brain
c) Fat
d) Muscle
e) Kidney

1.2) Which of the following is the least important for passage through capillary walls but the most important for passage through the cell wall?
a) Molecular size
b) Lipid solubility
c) Diffusion constant
d) pH
e) pKa

1.3) Which of the following is the most important for movement through capillary walls?
a) Molecular size
b) Lipid solubility
c) Diffusion constant
d) pH
e) pKa

1.4) Which of the following locations would most trap a lipid soluble drug?
a) Blood
b) Intestines
c) Brain
d) Stomach

1.5) What type of drugs can cross the blood-brain barrier (BBB)?
a) Large and lipid-soluble
b) Large and lipid-insoluble
c) Small and lipid-soluble
d) Small and lipid-insoluble

2.1) Acidic drugs, such as phenytoin, bind primarily to which of the following plasma proteins?
a) ⟨1–φετοπροτειν (AFP)
b) GC Globulin
c) Albumin
d) ⟨1–αχιδ glycoprotein (AAG)
e) Transcortin

2.2) Basic drugs, such as lidocaine, bind primarily to which of the following plasma proteins?
a) ⟨1–φετοπροτειν (AFP)
b) Gc-Globulin (GcG)
c) Albumin
d) ⟨1–αχιδ glycoprotein (AAG)
e) Transcortin

3.1) A decrease in drug-protein binding will lead to which of the following?
a) Decrease in the unbound drug concentration
b) Increase in free drug

c) Increase in rate of drug elimination
d) Decrease in volume of distribution

3.2) A patient presents with acute-onset cirrhosis of the liver. They are found to have hypoalbuminemia. In severe cirrhosis it is expected that AAG will be decreased, but the patient presents with increased AAG due to the inflammatory response. Which of the following is the most likely?

a) Increased acidic drug binding and increased basic drug binding
b) Increased acidic drug binding and decreased basic drug binding
c) Decreased acidic drug binding and increased basic drug binding
d) Decreased acidic drug binding and decreased basic drug binding

3.3) Which of the following is NOT a site of loss (where drug is not used)?

a) Fat
b) GI tract
c) Muscle
d) Site lacking receptors

4.1) Which of the following locations can accumulate lipid-soluble drugs, has little or no receptors, and can hold distributed drugs like barbiturates?

a) Liver
b) Kidney
c) Brain
d) Fat
e) Fetus

4.2) Which of the following locations has high blood flow and is a site of excretion?

a) Liver
b) Kidney
c) Brain
d) Fat
e) Fetus

4.3) Anything affecting renal perfusion will affect drug delivery to the kidney, drug excretion, and drug levels in the blood.

a) True
b) False

4.4) Which of the following can be treated with drugs due to a leaky area in the blood-brain barrier near the medulla?

a) Seizures
b) Shivers
c) Diarrhea
d) Nausea
e) Vomitting

4.5) What is the approximate lag time for equilibration between maternal blood and fetal tissues?

a) 20 mins
b) 40 mins
c) 1 hour
d) 2 hours
e) 6 hours

Match the body compartment with the volume, assuming a 70kg male patient:

5.1) Total bodya) 4
5.2) Plasmab) 10
5.3) Interstitialc) 14
5.4) Extracellulard) 28
5.5) Intracellulare) 42

5.6) If protein plasma binding is decreased, how will volume of distribution be affected?

a) Increased
b) Decreased
c) Not changed

5.7) 400 mg of a drug is administered to a patient and the drug is later measured in plasma to be 1 µg/ml. What is the apparent volume of distribution (Vd)?

a) 0.04 L
b) 0.4 L
c) 4 L
d) 40 L
e) 400 L

5.8) Elderly patients often have ____ muscle mass and thus a(n) ____ Vd.

a) More; Increased
b) More; Decreased
c) Less; Increased
d) Less; Decreased

5.9) Patients with ascites or edema would have ____ Vd for hydrophilic drugs, such as gentamicin.

a) Increased
b) Decreased
c) Unchanged

Pharmacokinetics:

Drug Metabolism

1.1) Which of the following locations is the most likely for finding a free, unaltered drug?
a) Urine
b) Feces
c) Breast milk
d) Fat
e) Sweat

1.2) Most drugs are active in their ____ form and inactive in their ____ form.
a) Non-polar; Polar
b) Polar; Non-polar
c) Water-soluble; Lipid-soluble
d) Lipid-insoluble; Water-insoluble
e) Neutral; Neutral

2.1) Drug biotransformation phase I makes drugs ____ polar for metabolism and phase II makes drugs ____ polar for excretion.
a) More; More
b) More; Less
c) Less; More
d) Less; Less

2.2) Which of the following is NOT a phase II substrate?
a) Glucuronic acid
b) Sulfuric acid
c) Acetic acid
d) Amino acids
e) Alcohol

3) Which of the following reactions is phase II and NOT phase I?
a) Oxidations
b) Reductions
c) Conjugations
d) Deaminations
e) Hydrolyses

4) Which of the following metabolically active tissues is the principle organ for drug metabolism?
a) Skin
b) Kidneys
c) Lungs
d) Liver
e) GI Tract

5.1) Damage at which of the following locations would most affect the goals of phase II biotransformation?
a) Skin
b) Kidneys
c) Lungs
d) Liver
e) GI Tract

– Pharmacokinetics: Principles of Eliminations

1.1) One liter contains 1,000 mg of a drug. After one hour, 900 mg of the drug remains. What is the clearance?

a) 100 mL
b) 100 mL/hr
c) 1 mg/ml
d) 100 mg
e) 1 mg/sec

1.2) To maintain a drug concentration at steady state, the dosing rate should equal the elimination rate. Which of the following is true? (CL = Drug Clearance)

a) Dosing rate = CL + target concentration
b) Dosing rate = CL - target concentration
c) Dosing rate = CL * target concentration
d) Dosing rate = CL / target concentration

1.3) Which of the following is most useful in determining the rate of elimination of a drug, in general?

a) Drug concentration in urine (renal elimination)
b) Drug concentration in stool (bilary elimination)
c) Drug concentration in blood
d) Drug concentration in brain
e) Drug oxidation rate

2.1) For first-order drug elimination, half-life t(1/2) is ____ at two places on the curve and a constant ____ is lost per unit time.

a) Equal; Amount
b) Equal; Percentage
c) Not equal; Amount
d) Not equal; Percentage

2.2) For first-order drug elimination, given the half-life equation of t(1/2) = (0.693 * Vd) / CL, how many half-lives would be necessary to reach steady state (≈95%) without a loading dose?

a) 1 to 2
b) 2 to 3
c) 3 to 4
d) 4 to 5
e) 5 to 6

2.3) Which of the following is NOT a drug exhibiting zero-order elimination kinetics?

a) Aspirin
b) Morphine
c) Phenytoin
d) ETOH

2.4) For zero-order drug elimination, half-life t(1/2) is ____ at two places on the curve and a constant ____ is lost per unit time.

a) Equal; Amount
b) Equal; Percentage
c) Not equal; Amount
d) Not equal; Percentage

2.5) If a drug with a 2-hour half life is given with an initial dose of 8 mcg/ml, assuming first-order kinetics, how much drug will be left at 6 hours?

a) 8 mcg/ml
b) 4 mcg/ml
c) 2 mcg/ml
d) 1 mcg/ml
e) 0.5 mcg/ml

3.1) What are the units for steady-state concentration (Css), or infusion rate over clearance?

a) mg/min
b) ml/min
c) mg/ml
d) ml/mg
e) min/mg

3.2) What percentage of the steady-state drug concentration is achieved at 3.3 * t(1/2)?

a) 10%
b) 25%
c) 50%
d) 75%
e) 90%

4.1) Increasing the rate of infusion changes the time necessary to reach the steady-state concentration.

a) True
b) False

4.2) An injection of two units of a drug once-daily (qd) will yield the same steady-state concentration as an injection of one unit of a drug twice-daily (bid).

a) True
b) False

5.1) Which of the following drugs would most likely need a loading dose to help reach therapeutic levels?

a) Acetaminophen, t(1/2) = 2 h
b) Aspirin, t(1/2) = 15 m
c) Tetracycline, t(1/2) = 11 h
d) Digitoxin, t(1/2) = 161 h
e) Adenosine, t(1/2) = 10 s

5.2) A target concentration of 7.5 mg/L of theophylline is required for a 60 kg patient. What is the loading dose, given the following: Vd = 0.5 L/kg, Cl = 0.04 L/kg/hr, t(1/2) = 9.3 hr?

a) 0.5 L/kg * 60 kg * 7.5 mg/L = 225 mg/h, infusion
b) 0.5 L/kg * 60 kg * 7.5 mg/L = 225 mg, bolus
c) 0.04 L/kg/hr * 60 kg * 7.5 mg/L = 18 mg/h, infusion
d) 0.04 L/kg/hr * 60 kg * 7.5 mg/L = 18 mg, bolus

5.3) A target concentration of 7.5 mg/L of theophylline is required for a 60 kg patient. What is the steady state maintenance dose, given the following: Vd = 0.5 L/kg, Cl = 0.04 L/kg/hr, t(1/2) = 9.3 hr?

a) 0.5 L/kg * 60 kg * 7.5 mg/L = 225 mg/h, infusion
b) 0.5 L/kg * 60 kg * 7.5 mg/L = 225 mg, bolus
c) 0.04 L/kg/hr * 60 kg * 7.5 mg/L = 18 mg/h, infusion
d) 0.04 L/kg/hr * 60 kg * 7.5 mg/L = 18 mg, bolus