

## QUESTIONS

Select the single best answer.

1 A 79-year-old man with end-stage Alzheimer's disease and dysphagia is taking multiple medications. Physical examination reveals xerostomia and a limited gag reflex. Which of the following routes of medication administration would provide the lowest serum drug concentration?

(A) Enteral (B) Intramuscular (C) Intrathecal (D) Intravenous (E) Transdermal

2 A 28-year-old man with seborrheic dermatitis is prescribed a topical corticosteroid crème by his dermatologist in hopes of alleviating the chronic rash and erythema on the cheeks. Which of the following steps is most critical to achieve a therapeutic drug concentration in plasma?

(A) Absorption (B) Distribution (C) Elimination (D) Glycosylation (E) Metabolism

3 A 31-year-old man is brought to the emergency department complaining of dyspnea. He has a history of asthma and has had multiple asthma attacks requiring intubation for airway maintenance. He is noncompliant with his medications prescribed for this condition. Physical examination reveals a young man in acute distress. His room air oxygen saturation is 87%. In addition to administration of oxygen, immediate drug administration of albuterol should be administered by which of the following routes?

(A) Inhalation  
(B) Intranasal puff metered dose  
(C) Subcutaneous  
(D) Sublingual  
(E) Topical

4 A 27-year-old female with vulvovaginal candidiasis is given a one-time 100 mg dose of oral fluconazole. She has no other pertinent medical problems and takes no prescription medications. Administration of the medication results in a peak plasma concentration of 20 mg/mL. What is the apparent volume of drug distribution?

(A) 0.5 L (B) 1L (C) 3 L (D) 5 L (E) 50L

5 A 48-year-old man with end-stage liver disease is hospitalized on the intensive care unit. Review of his blood work reveals elevated liver function tests to five times the normal rate. The patient is receiving multiple intravenous medications. Which of the following medications is likely to be therapeutic for this patient? (A) Epinephrine

(B) Erythromycin (C) Nifedipine (D) Rifampin  
(E) Verapamil

6 A 29-year-old man presents to his primary care physician complaining of dysuria, urgency, and painful ejaculation. The patient has a past medical history of allergic rhinitis. Physical examination reveals a tender prostate. The patient is given a prescription of sulfamethoxazole to be taken daily (q 12 h) for 30 days. The half-life

is 12 h. How long will it take for the medication to reach 90% of its final steady state level?

(A) 10 h (B) 20h (C) 30 h (D) 40 h (E) 50h

7 A hospitalized patient with systemic candidiasis is receiving intravenous antifungal medications. He also has hepatic and renal insufficiency. Which of the following drug administration schemes would allow for the most steady state amount of drug in the body over a 2-week hospitalization period where medication administration will be necessary?

- (A) Continuous IV infusion
- (B) Once weekly IV injection
- (C) Single daily IV injection
- (D) Twice daily IV injection
- (E) Twice weekly IV injection

8 A 27-year-old man with HIV disease and hepatic insufficiency presents to his primary care physician complaining of rectal pain and bleeding with bowel movements. Physical examination reveals several internal and external hemorrhoids. The patient would like to avoid surgical therapy for this condition. Which of the following routes of drug administration would be preferred in this patient?

- (A) Enteral
- (B) Intramuscular (C) Intravenous (D) Rectal
- (E) Transdermal

9 A hospitalized patient with systemic infection is receiving intravenous antibiotics. He also has hepatic and renal insufficiency. After receiving medications for 5 days, he is found by nursing staff to be jaundiced. Drug toxicology profile is obtained and indicated drug levels of 10 times the acceptable value. Which of the following drug administration schemes is most likely to explain this situation?

- (A) Continuous IV infusion
- (B) Once weekly IV injection
- (C) Single daily IV injection
- (D) Twice daily IV injection
- (E) Twice weekly IV injection

10 A patient receives a single dose of antibiotics following a prostate needle biopsy. He takes 500 mg of ciprofloxacin immediately after completion of the procedure. The half-life of the medication is 8 h. At approximately how many half-lives will it take for 90% of the drug to be excreted from the body?

(A) 1.0 (B) 2.0 (C) 3.0 (D) 3.3 (E) 5.0

11 The P-glycoprotein is a multidrug transmembrane transporter protein that transports medications across cell membranes. Functions of this protein include

- (A) Pumping drugs into the urine for excretion
- (B) Transport of drugs into liver hepatocytes

- (C) Transport of drugs into fetal circulation for fetal treatment
- (D) Transport of drugs from the intestinal lumen to the circulation
- (E) Transport of drugs from the bloodstream into brain cells

12 A researcher is studying the bioavailability of commonly used antimuscarinics to treat irritable bowel syndrome. Medication A is administered in a 100 mg daily dose orally and 60 mg of the drug is absorbed from the gastrointestinal tract unchanged. Thus, the bioavailability of Medication A is  
(A) 50% (B) 60% (C) 70% (D) 80% (E) 90%

13 A 40-year-old man is brought to the emergency department after suffering a cardiac arrest while in a shopping mall. His blood pressure is 70/40 mm Hg and his pulse is 40 beats/minute. He is given a dose of intravenous epinephrine. Which of the following reactions is necessary to induce a biologic response of increased heart rate?  
(A) Detrusor contraction  
(B) Drug-receptor complex formation  
(C) Hepatic oxidation reaction  
(D) Renal arteriolar contraction  
(E) Splanchnic nerve stimulation

14 A 59-year-old female with diabetes presents to her primary care physician for routine follow-up. Her current medications include insulin. Her fasting blood sugars are in the range of 80 to 120 mg/dL. The intracellular effects of this medication are likely caused by which of the following mechanisms of action?  
(A) Changes in ionic concentration within the cell  
(B) Changes in membrane potential  
(C) Protein phosphorylation  
(D) Protein and receptor phosphorylation  
(E) Receptor destruction

15 The therapeutic index of a drug is the ratio of the dose that produces toxicity to the dose that produces an efficacious response. By this definition, which of the following medications has the largest therapeutic index?  
(A) Diazepam 20  
(B) Digoxin  
(C) Gentamicin  
(D) Lithium

16 A medical student is doing a summer research project studying *in vitro* antibiotics to determine potency using the EC<sub>50</sub>. Antibiotics are placed in plated culture wells with 100,000 CFU of *Escherichia coli*. The EC<sub>50</sub> results for the *in vitro* antibiotics are shown in the following choices. Based on the results, the most potent antibiotic is  
(A) Antibiotic A EC<sub>50</sub> 5 100  
(B) Antibiotic B EC<sub>50</sub> 5 2

- (C) Antibiotic C EC<sub>50</sub> 5 80
- (D) Antibiotic D EC<sub>50</sub> 5 20
- (E) Antibiotic E EC<sub>50</sub> 5 50

17 A drug that binds to a receptor and produces a biological response that mimics the response to the endogenous ligand is known as

- (A) Agonist
- (B) Antagonist
- (C) Functional antagonist (D) Partial agonist
- (E) Partial antagonist

18 A 47-year-old HIV positive male with hepatic insufficiency and renal insufficiency presents to his primary care physician complaining of dysuria. Urine culture reveals greater than 100,000 CFU/mL of Escherichia coli pan-sensitive to all antibiotics.

Which of the following would be the most appropriate treatment for this patient?

- (A) Chloramphenicol (B) Erythromycin (C) Gentamicin
- (D) Penicillin
- (E) Rifampin

19 A researcher for a pharmaceutical company is studying a new medication to treat parkinsonism. The medication is dosed at 10 mg and causes improvement in bradykinesia and cogwheel rigidity in 99% of patients. However, 100 mg of this medication causes toxicity manifested as seizures in 1% of the population treated with this medication. What is the standard margin of safety of this medication?

- (A) 100 (B) 300 (C) 500 (D) 700 (E) 900

20 A 67-year-old hospitalized patient with a deep venous thrombosis of the left calf and pulmonary embolism is currently on intravenous heparin on an hourly drip. Unfortunately, because of a calculation error, the heparin drip is running at 100 times the rate it should be running at. Protamine sulfate is immediately given intravenously. This agent works by which of the following mechanisms of action?

- (A) Agonist
- (B) Chemical antagonist
- (C) Functional agonist
- (D) Partial agonist
- (E) Partial antagonist

21 A 54-year-old man is hospitalized with an infection. He is being treated with an intravenous injection of antibiotics. The following curve represents different doses of drug administration based on various pharmacokinetics. Which of the following curves would produce the largest amount of drug available in the body?

- (A) Curve A
- (B) Curve B
- (C) Curve C
- (D) Cannot be determined

