

## Pharmacology Sample Items

1. Ten months after starting procainamide therapy for cardiac arrhythmias, a 56-year-old man develops arthritis and other symptoms consistent with drug-induced systemic lupus erythematosus. Results of a blood test are positive for antinuclear antibodies. This finding is consistent with which of the following genetic polymorphisms in drug metabolism?
  - (A) Debrisoquine 4-hydroxylase deficiency
  - (B) Erythrocyte catechol-*O*-methyltransferase deficiency
  - (C) Glucose 6-phosphate dehydrogenase deficiency
  - (D) Phenytoin hydroxylase deficiency
  - (E) Slow acetylator phenotype
  
2. An 83-year-old man has a 2-month history of akinesia, rigidity, and tremor. He has been taking a drug for the past 7 years to control severe behavioral and psychiatric symptoms associated with dementia, Alzheimer type. This adverse effect is most likely mediated through which of the following?
  - (A) Anticholinergic effects
  - (B) Antidopaminergic effects
  - (C) Downregulation of  $\gamma$ -aminobutyric acid (GABA)
  - (D) Inhibition of norepinephrine reuptake
  - (E) Inhibition of serotonin reuptake
  - (F) Upregulation of GABA
  
3. A 23-year-old man with HIV infection has *Pneumocystis jirovecii* pneumonia. Therapy is started with trimethoprim-sulfamethoxazole, and his pneumonia resolves. The pharmacotherapy was effective because of inhibition of which of the following?
  - (A) Cell wall synthesis
  - (B) Dihydrofolate reductase
  - (C) Incorporation of *p*-aminobenzoic acid
  - (D) Incorporation of sterol into membranes
  - (E) Topoisomerase II
  
4. A 62-year-old man comes to the physician because of burning pain and tenderness of his right great toe 1 day after heavy ethanol consumption. Physical examination shows erythema, swelling, warmth, and tenderness of the right great toe. After a 2-week course of nonsteroidal anti-inflammatory drug treatment, his symptoms decrease in severity but do not completely resolve. The serum concentration of which of the following is most likely increased in this patient?
  - (A) Calcium
  - (B) Carotene
  - (C) Creatinine
  - (D) Iron
  - (E) Orotic acid
  - (F) Phosphate
  - (G) Uric acid
  
5. A 62-year-old man is being treated with cisplatin for small cell carcinoma of the lungs. The efficacy of cisplatin depends on interaction with which of the following?
  - (A) DNA
  - (B) DNA polymerase
  - (C) Growth factor receptors
  - (D) Reverse transcriptase
  - (E) Ribosomes

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6. An 18-year-old woman comes to the physician because of nausea, vomiting, and abdominal pain 1 hour after ingesting a glass of wine with dinner. Three days ago, she began antibiotic treatment for vaginitis after a wet mount preparation of vaginal discharge showed a motile protozoan. This patient most likely has been taking which of the following drugs?
- (A) Ceftriaxone
  - (B) Chloroquine
  - (C) Clindamycin
  - (D) Metronidazole
7. A 20-year-old woman comes to the emergency department after ingesting at least 30 tablets of an unknown drug. Initial physical examination shows no abnormalities. Thirty-six hours later, serum AST activity is 1500 U/L, and serum ALT activity is 2000 U/L. The drug this patient ingested is most likely which of the following?
- (A) Acetaminophen
  - (B) Aspirin
  - (C) Chlorpheniramine
  - (D) Ibuprofen
  - (E) Prednisone
8. A 42-year-old woman who is a chemist is brought to the emergency department because of a 1-hour history of severe abdominal cramps, nausea and vomiting, hypotension, bradycardia, sweating, and difficulty breathing due to bronchospasm and congestion. Exposure to which of the following is most likely?
- (A) Acrylamide
  - (B) Cyanogen bromide
  - (C) Isoflurophate (DFP)
  - (D) Phentolamine
  - (E) Propranolol
9. A 35-year-old woman is diagnosed with gastroesophageal reflux disease. Omeprazole is administered. Which of the following is the most likely mechanism of action of this drug?
- (A) Blockade of gastrin receptors
  - (B) Blockade of  $H_1$  receptors
  - (C) Blockade of  $M_3$  receptors
  - (D) Inhibition of  $H^+-K^+$  ATPase activity
  - (E) Inhibition of synthesis of gastrin
10. In a 40-year-old man with hypertension, which of the following agents has the greatest potential to activate presynaptic autoreceptors, inhibit norepinephrine release, and decrease sympathetic outflow?
- (A)  $\alpha_1$ -Adrenergic agonist
  - (B)  $\alpha_2$ -Adrenergic agonist
  - (C)  $\beta_1/\beta_2$ -Adrenergic antagonist
  - (D) Angiotensin-converting enzyme inhibitor
  - (E) Calcium antagonist

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11. A 35-year-old woman is brought to the emergency department because of an 18-hour history of severe pain, nausea, vomiting, diarrhea, and anxiety. She was discharged with a pain medication from the hospital 2 weeks ago after treatment of multiple injuries sustained in a motor vehicle collision. She took her last dose 36 hours ago. Her temperature is 36.6°C (97.8°F), pulse is 105/min, respirations are 24/min, and blood pressure is 160/85 mm Hg. Physical examination shows rhinorrhea and piloerection. Bowel sounds are normal. She rates the pain as an 8 on a 10-point scale. Which of the following is the most likely diagnosis?
- (A) Acute appendicitis
  - (B) Caffeine withdrawal
  - (C) Ethanol withdrawal
  - (D) Gastric ulcers
  - (E) Gastroenteritis
  - (F) Oxycodone withdrawal
12. A 21-year-old woman comes to the physician for counseling prior to conception. She delivered a female newborn with anencephaly 1 year ago. The newborn died at the age of 4 days. She asks the physician if she can take any vitamins to decrease her risk for conceiving a fetus with anencephaly. It is most appropriate for the physician to recommend which of the following vitamins?
- (A) Biotin
  - (B) Folic acid
  - (C) Vitamin B<sub>1</sub> (thiamine)
  - (D) Vitamin B<sub>2</sub> (riboflavin)
  - (E) Vitamin B<sub>6</sub> (pyridoxine)
  - (F) Vitamin B<sub>12</sub> (cyanocobalamin)
13. A 38-year-old man comes to the physician because of a 6-month history of occasional episodes of chest tightness, wheezing, and cough. The symptoms are often mild and resolve spontaneously. He has been otherwise healthy. His respirations are 13/min. The lungs are clear to auscultation. Cardiac examination and chest x-ray show no abnormalities. Which of the following agents is most appropriate to treat acute episodes in this patient?
- (A) Albuterol
  - (B) Beclomethasone
  - (C) Cromolyn
  - (D) Ipratropium
  - (E) Theophylline
14. A new drug, Drug X, relieves pain by interacting with a specific receptor in the body. Drug X binds irreversibly to this receptor, resulting in a long duration of action. Which of the following types of bonds is most likely formed between Drug X and its receptor?
- (A) Covalent
  - (B) Hydrogen
  - (C) Hydrophobic
  - (D) Ionic
  - (E) van der Waals
15. A 49-year-old man with hypertension comes to the physician for a follow-up examination. At his last visit 2 months ago, his serum total cholesterol concentration was 320 mg/dL. He then began a low-cholesterol diet. His blood pressure is 145/95 mm Hg. Physical examination shows no other abnormalities. Serum studies show a total cholesterol concentration of 310 mg/dL. Kidney and liver function test results are within normal limits. The most appropriate pharmacotherapy for this patient is a drug that has which of the following mechanisms of action?
- (A) Activates peroxisome proliferator-activated receptors
  - (B) Decreases hepatic production of VLDL cholesterol
  - (C) Forms insoluble complexes with bile acids in the gut
  - (D) Impairs absorption of cholesterol in the small intestine brush border
  - (E) Inhibits 3-HMG-CoA reductase

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16. A 17-year-old girl is brought to the physician by her parents 30 minutes after having a generalized tonic-clonic seizure while playing in a soccer game. She currently takes no medications. Physical examination shows no abnormalities. After further testing including 24-hour continuous EEG monitoring, carbamazepine is prescribed. This patient's use of additional medications should be monitored because of which of the following changes in drug disposition after starting pharmacotherapy?
- (A) Decreased absorption in the intestine
  - (B) Decreased distribution to the brain
  - (C) Increased excretion by the kidneys
  - (D) Increased metabolism by the liver
  - (E) Increased recirculation in the bile
17. A 14-year-old boy is brought to the physician for examination prior to participating on his school's soccer team. Physical examination shows jaundice. Serum studies show a total bilirubin concentration of 2.5 mg/dL, ALT activity of 70 U/L, and ceruloplasmin concentration of 5 mg/dL (N=20–40). A slit-lamp examination shows the presence of brownish rings in the cornea, surrounding the iris. The most appropriate treatment at this time is a drug with which of the following mechanisms of action?
- (A) Decreases serum bilirubin concentration
  - (B) Decreases urine selenium excretion
  - (C) Increases serum chloride concentration
  - (D) Increases urine copper excretion
  - (E) Increases urine lead excretion
18. A 60-year-old woman comes to the physician because she recently was diagnosed with non-small cell lung carcinoma and she wants to discuss possible treatment options. She tells the physician that she is concerned about the possible adverse effects of chemotherapy. The physician says that serious toxicity caused by antineoplastic drugs is seen in the bone marrow. Which of the following best explains this finding?
- (A) Cells in the marrow divide rapidly
  - (B) Cells in the marrow have specific surface targets for most of these drugs
  - (C) Cells in the marrow lack the enzymes to protect against the drugs
  - (D) Chemotherapy drugs act preferentially against cells with no nucleus
  - (E) Chemotherapy drugs penetrate well into the marrow because it is very vascular
  - (F) Chemotherapy drugs tend to be lipid-soluble and concentrate in the marrow
19. A 38-year-old woman with an 18-year history of type 1 diabetes mellitus and progressive renal failure is being considered for dialysis. Laboratory studies show normocytic, normochromic anemia. Which of the following medications is most appropriate to treat the anemia in this patient?
- (A) Erythropoietin
  - (B) Folic acid
  - (C) Folinic acid
  - (D) Vitamin B<sub>1</sub> (thiamine)
  - (E) Vitamin B<sub>12</sub> (cyanocobalamin)
20. A 47-year-old woman is admitted to the hospital for treatment of pneumococcal pneumonia. Treatment with gentamicin and penicillin is initiated. Within 10 minutes of the administration of antimicrobial therapy, her respirations increase to 30/min, and blood pressure decreases to 80/40 mm Hg. Epinephrine, antihistamine, and corticosteroid therapy is started. Her condition improves slowly during the next 2 hours. Her antimicrobial therapy is changed to gentamicin only, and her condition continues to improve. Administration of which of the following types of drugs is most likely to cause a similar adverse reaction in this patient?
- (A) Cephalosporins
  - (B) Macrolides
  - (C) Quinolones
  - (D) Tetracyclines

**Pharmacology Sample Items**

**Answer Form for Pharmacology Sample  
Questions**

**(Questions 1–20)**

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|-----------|-----------|
| 1. _____  | 11. _____ |
| 2. _____  | 12. _____ |
| 3. _____  | 13. _____ |
| 4. _____  | 14. _____ |
| 5. _____  | 15. _____ |
| 6. _____  | 16. _____ |
| 7. _____  | 17. _____ |
| 8. _____  | 18. _____ |
| 9. _____  | 19. _____ |
| 10. _____ | 20. _____ |

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### Answer Key for Pharmacology Sample Questions

#### (Questions 1–20)

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|-----|---|-----|---|
| 1.  | E | 11. | F |
| 2.  | B | 12. | B |
| 3.  | B | 13. | A |
| 4.  | G | 14. | A |
| 5.  | A | 15. | E |
| 6.  | D | 16. | D |
| 7.  | A | 17. | D |
| 8.  | C | 18. | A |
| 9.  | D | 19. | A |
| 10. | B | 20. | A |