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Name:_____ Class:_____ Date:_____

TB15 Chapter 1

1. The *pharmacokinetic process* that breaks down a drug is known as _____.
    a. elimination
    b. absorption
    c. distribution
    d. metabolism

ANSWER: d

2. The *pharmacokinetic process* that would get rid of a drug from the body is known as _____.
    a. elimination
    b. withdrawal
    c. rejection
    d. metabolism

ANSWER: a

3. The body *eliminates* drugs usually through _____.
    a. exhaling
    b. the urine
    c. the feces
    d. sweating

ANSWER: b

4. The four basic processes of *pharmacokinetics* are:
    a. absorption, distribution, metabolism, and elimination.
    b. inhalation, absorption, elimination, and thermoregulation.
    c. inhalation, metabolism, monitoring, and accumulation.
    d. elimination, acceptance, distribution, and metabolism.

ANSWER: a

5. Which term is NOT a *pharmacokinetic* process?
    a. distribution
    b. accumulation
    c. absorption
    d. metabolism

ANSWER: b

6. Which term is NOT a *pharmacokinetic* process?
    a. elimination
    b. absorption
    c. distribution

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d. regulation

ANSWER: d

7. Which term is NOT a *pharmacokinetic* process?
   a. absorption
   b. elimination
   c. maintenance
   d. metabolism

ANSWER: c

8. The quantity of drug that reaches its target is determined by its:
   a. absorption.
   b. distribution and metabolism.
   c. absorption, distribution, and metabolism.
   d. absorption, distribution, metabolism, and elimination.

ANSWER: d

9. The study of the movement of drugs through the body over time is termed:
   a. pharmacology.
   b. physiology.
   c. pharmacodynamics.
   d. pharmacokinetics.

ANSWER: d

10. The study of how the body processes drugs is termed:
   a. pharmacology.
   b. physiology.
   c. pharmacodynamics.
   d. pharmacokinetics.

ANSWER: d

11. *Pharmacokinetics* is defined as the study of:
   a. the movement of drugs through the body.
   b. drug mechanisms of action within the body.
   c. drugs and neuroscience.
   d. drugs and behavior.

ANSWER: a

12. *Kinetics* refers to:

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a. dependence and tolerance.
b. speed and dose.
c. movement and time.
d. absorption and distribution.

ANSWER: c

13. In its simplest form, *pharmacokinetics* describes a drug's:
a. strength.
b. time course.
c. main effects.
d. toxicity levels.

ANSWER: b

14. The term *kinetics* implies _____ and time.
a. place
b. direction
c. space
d. movement

ANSWER: d

15. The main difference between the two antianxiety drugs, lorazepam (Ativan) and triazolam (Halcion), can best be described as:
a. psychological.
b. pharmacodynamic.
c. homeostatic.
d. pharmacokinetic.

ANSWER: d

16. The main difference between the two antianxiety drugs, lorazepam (Ativan) and triazolam (Halcion), is related to:
a. side effects.
b. pharmacokinetics.
c. efficacy.
d. cost.

ANSWER: b

17. Lorazepam (Ativan) persists in the body for at least _____ hours, which is _____ than the time course for triazolam (Halcion).
a. 8; shorter

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b. 8; longer

c. 24; shorter

d. 24; longer

ANSWER: d

18. Lorazepam (Ativan) persists in the body for _____ than the time course for triazolam (Halcion). Both of these drugs are a type of _____ medication.

a. shorter; analgesic

b. shorter; antianxiety

c. longer; analgesic

d. longer; antianxiety

ANSWER: d

19. The _____ range of lorazepam (Ativan) lasts _____ than triazolam (Halcion).

a. therapeutic; shorter

b. therapeutic; longer

c. toxic; shorter

d. toxic, longer

ANSWER: b

20. _____ refers to the process of a drug entering the bloodstream.

a. Excretion

b. Absorption

c. Distribution

d. Metabolism

ANSWER: b

21. *Absorption* is considered:

a. the process of a drug entering the bloodstream.

b. the breakdown of a drug into smaller components.

c. a pharmacodynamic process.

d. more than one of the above.

ANSWER: a

22. Which phrase best describes a *prodrug*?

a. a drug that alters pharmacokinetic processes

b. a drug that is superior in its effectiveness

c. a drug that has minimal side effects

d. a precursor of a drug

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ANSWER: d

23. *Passive diffusion* usually occurs when drug molecules pass from an area of _____ concentration into an area of _____ concentration.
    a. low; low
    b. low; high
    c. high; low
    d. high; high

ANSWER: c

24. Which drug attribute increases the likelihood of drug absorption?
    a. high lipid solubility
    b. low lipid solubility
    c. large size
    d. small size

ANSWER: a

25. A drug that is _____ in lipid solubility increases the rate of _____.
    a. low; metabolism
    b. low; absorption
    c. high; metabolism
    d. high; absorption

ANSWER: d

26. A drug that is _____ in lipid solubility increases the rate of _____.
    a. low; metabolism
    b. low; absorption
    c. high; metabolism
    d. high; absorption

ANSWER: d

27. An *orally administered* psychoactive drug is typically absorbed into the bloodstream within _____.
    a. 15-30 min
    b. 45-60 min
    c. 1-3 hours
    d. 3-6 hours

ANSWER: c

28. Drugs absorbed into capillaries of the gastrointestinal tract are first carried to the _____.
    a. heart

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b. liver
c. kidneys
d. brain

ANSWER: b

29. Which antianxiety drug is limited in being absorbed orally?
a. lorazepam (Ativan)
b. buspirone (BuSpar)
c. triazolam (Halcion)
d. all of the above

ANSWER: b

30. Compared to other drugs orally administered, buspirone (BuSpar) is _____.
a. absorbed slowly
b. absorbed rapidly
c. metabolized slowly
d. metabolized rapidly

ANSWER: d

31. Once a drug enters the bloodstream via the intestines, where does the drug go first?
a. to the heart
b. to the kidney
c. to the liver
d. It gets distributed fairly evenly throughout the body, to no particular place first.

ANSWER: c

32. One substance capable of inhibiting enzymatic degradation in the liver and gastrointestinal tract is:
a. SSRI-type antidepressants.
b. grapefruit juice.
c. carbamazepine (Tegretol).
d. cytochrome P450 enzymes.

ANSWER: b

33. Grapefruit juice is known to _____ a(n) _____.
a. inhibit; enzyme
b. inhibit; drug
c. enhance; enzyme
d. enhance; drug

ANSWER: a

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34. For buspirone (BuSpar), grapefruit juice is known to:
    a. decrease absorption.
    b. decrease metabolism.
    c. increase absorption.
    d. increase metabolism.

ANSWER: c

35. Grapefruit and other juices are known to _____ of various drugs.
    a. decrease absorption
    b. decrease metabolism
    c. increase absorption
    d. increase metabolism

ANSWER: c

36. Two occasional side effects that can occur during oral administration of drugs, in general, are:
    a. vomiting and stomach distress.
    b. diarrhea and stomach distress.
    c. dehydration and poor nutrient absorption from foods.
    d. throat irritation and poor nutrient absorption from foods.

ANSWER: a

37. *Rectal drug administration* may be used in place of oral drug administration to avoid:
    a. absorption into bloodstream.
    b. irritation to mucous membranes.
    c. too rapid drug absorption.
    d. nausea/vomiting.

ANSWER: d

38. Drugs in a *suppository* would be absorbed _____.
    a. orally
    b. rectally
    c. by subcutaneous injection
    d. by intramuscular injection

ANSWER: b

39. Lung tissues have a _____ surface area, which would _____ the rate of absorption, compared to other routes of drug administration.
    a. small; decrease
    b. small; increase

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c. large; decrease

d. large; increase

ANSWER: d

40. The surface area of lung tissues is a characteristic that typically _____ the rate of drug absorption, compared to other routes of administration.

a. decreases

b. increases

c. doesn't change

d. none of the above; depends on the drug

ANSWER: b

41. Drugs absorbed into pulmonary (lung) capillaries are carried in the pulmonary _____ directly to the _____ side of the heart.

a. artery; left

b. artery; right

c. vein; left

d. vein; right

ANSWER: c

42. Drugs absorbed into pulmonary (lung) capillaries are first carried to the _____.

a. heart

b. liver

c. kidneys

d. brain

ANSWER: a

43. Drugs absorbed into pulmonary (lung) capillaries are first carried to the _____; drugs absorbed into gastrointestinal capillaries are first carried to the _____.

a. heart; heart

b. heart; liver

c. liver; heart

d. liver; liver

ANSWER: b

44. Drugs absorbed into pulmonary (lung) capillaries are first carried to the _____ side of the heart; drugs absorbed into gastrointestinal capillaries are first carried to the _____ side of the heart.

a. left; left

b. left; right

c. right; left

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d. right; right

ANSWER: b

45. What is the main reason that inhalation can be an efficient route of drug administration?
a. the large surface area of lung tissue
b. the porous surface of the lung tissue
c. the gaseous state of the drug
d. the high lipid solubility of commonly inhaled drugs

ANSWER: a

46. *Transdermal patches* provide continuous release of a drug, which typically lasts _____.
a. seconds to minutes
b. minutes to hours
c. hours to days
d. days to weeks

ANSWER: c

47. The main advantage of administering a drug through a *transdermal patch* is:
a. lack of irritation to tissue.
b. speed of onset of drug action.
c. ability to avoid absorption into bloodstream.
d. relative constancy of drug levels in plasma.

ANSWER: d

48. *Subcutaneous administration* refers to:
a. in the heart.
b. in the muscle.
c. under the skin.
d. a transdermal patch.

ANSWER: c

49. Which of the following is NOT a *disadvantage* of drug administration by injection?
a. There is little time to correct an unexpected drug reaction or accidental overdose.
b. Once a drug is injected, it cannot be removed from the body.
c. Drug injection requires that sterile procedures are used otherwise infection may be introduced into the body.
d. This method of drug administration is slower and the response may be unpredictable.

ANSWER: d

50. With the exception of the mode employed with some gas anesthetics, the fastest mode of drug

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administration is:

a. inhalation.
b. intramuscular injection.
c. subcutaneous injection.
d. intravenous injection.

ANSWER: d

51. The most dangerous mode of drug administration is:

a. inhalation.
b. intramuscular injection.
c. subcutaneous injection.
d. intravenous injection.

ANSWER: d

52. Drawbacks to intravenous injection of drugs, as opposed to other forms of administration, include all the following EXCEPT:

a. a constant danger of allergic reaction and/or respiratory collapse.
b. the greatest risk of blood clots.
c. the greatest risk of infection.
d. an increased risk of unpredictable absorption.

ANSWER: d

53. The two types of *intramuscular injections* are:

a. rapid and slow onset.
b. therapeutics and vaccines.
c. mild and strong sedatives.
d. mild and strong analgesics.

ANSWER: a

54. *Intramuscular injections* of drugs in an aqueous solution are _____.

a. slow onset
b. rapid onset
c. readily metabolized
d. incompletely absorbed

ANSWER: b

55. *Intramuscular injections* of drugs in an oily solution are _____.

a. slow onset
b. rapid onset

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c. readily metabolized
d. incompletely absorbed

ANSWER: a

56. *Intramuscular injections* of drugs in an oily solution are also known as _____.
a. depot administration
b. rapid onset
c. short duration
d. lollipops

ANSWER: a

57. *Intramuscular injections* of drugs in an oily solution are completely absorbed within _____.
a. seconds or minutes
b. minutes or hours
c. hours or days
d. days or weeks

ANSWER: d

58. *Intramuscular injections* of drugs in an aqueous solution are completely absorbed within _____.
a. seconds
b. minutes
c. hours
d. days

ANSWER: c

59. *Intramuscular injections* of drugs placed in bioabsorbable polymer microspheres are completely absorbed within _____.
a. seconds
b. minutes
c. hours
d. days

ANSWER: d

60. *Depot administration* is a type of _____.
a. intramuscular injection
b. intravenous injection
c. subcutaneous injection
d. aqueous injection

ANSWER: a

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61. *Bioabsorbable polymer microspheres* are a type of _____.
    a. intramuscular injection
    b. intravenous injection
    c. subcutaneous injection
    d. aqueous injection

ANSWER: a

62. *Injected microcapsules* are a type of _____.
    a. intramuscular injection
    b. intravenous injection
    c. subcutaneous injection
    d. aqueous injection

ANSWER: a

63. _____ occurs once a drug has entered the bloodstream, while _____ occurs once a drug is circulating throughout the bloodstream to various tissues.
    a. Distribution; absorption
    b. Distribution; excretion
    c. Absorption; excretion
    d. Absorption; distribution

ANSWER: d

64. *Distribution* is considered:
    a. the process of a drug entering the bloodstream.
    b. the breakdown of a drug into smaller components.
    c. a pharmacokinetic process.
    d. more than one of the above.

ANSWER: c

65. Every _____ seconds, the heart pumps a volume of blood that is roughly equal to the total amount of blood in the circulatory system.
    a. 30
    b. 60
    c. 90
    d. 120

ANSWER: b

66. The entire blood volume circulates in the body about once every _____ seconds.
    a. 30

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b. 60

c. 90

d. 120

ANSWER: b

67. Once absorbed into the bloodstream, a drug is rapidly distributed throughout the circulatory system in about _____ seconds.

a. 30

b. 60

c. 90

d. 120

ANSWER: b

68. When administered by *injection* and *inhalation*, drugs enter the _____ and _____ side of the heart, respectively.

a. right; right

b. right; left

c. left; right

d. left; left

ANSWER: b

69. Enzymes that degrade a drug in the gastrointestinal tract and liver decrease the amount of drug that reaches the circulation by a mechanism known as:

a. enzymatic degradation.

b. gastroenteritis.

c. drug tolerance.

d. first-pass metabolism.

ANSWER: d

70. *First-pass metabolism* occurs in the _____.

a. liver

b. heart

c. gastrointestinal tract

d. Two of the above

ANSWER: d

71. *First-pass metabolism* refers to a drug passing through the:

a. small intestine.

b. stomach.

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c. liver.

d. All the above.

ANSWER: d

72. Women have _____ alcohol dehydrogenase in the GI tract cells than men do, which means that women exhibit _____ blood alcohol levels for a given amount of alcohol ingested.

a. less; lower

b. less; higher

c. more; lower

d. more; higher

ANSWER: b

73. Which membrane does NOT affect drug distribution?

a. intestinal wall

b. capillary wall

c. placental barrier

d. blood-brain barrier

ANSWER: a

74. *Cell membranes* are permeable to _____ drug molecules which are _____-soluble.

a. small; lipid

b. small; water

c. large; lipid

d. large; water

ANSWER: a

75. *Cell membranes* are permeable to _____ drug molecules.

a. small

b. large

c. small and large

d. None of the above

ANSWER: a

76. Which of the following is a factor related to the ability of a drug to cross the wall of capillaries located outside the brain?

a. size

b. water solubility

c. lipid solubility

d. none of the above

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ANSWER: d

77. The walls of capillaries outside the brain are made of _____ layer(s); cell membranes are made of _____ layer(s).
   a. 1; 1
   b. 1; 2
   c. 2; 1
   d. 2; 2

ANSWER: b

78. *Cell membranes* are permeable to _____ drug molecules.
   a. small, water-soluble
   b. small, lipid-soluble
   c. small and large, water -soluble
   d. small and large, lipid-soluble

ANSWER: b

79. *Cell membranes* are permeable to _____ drug molecules.
   a. small, water-soluble
   b. small, lipid-soluble
   c. small and large, water-soluble
   d. small and large, lipid-soluble

ANSWER: b

80. *Penicillin* cannot be used to treat infections located in the central nervous system because:
   a. it is destroyed by enzymes in the brain.
   b. it cannot pass through the blood-brain barrier.
   c. it is too highly lipid soluble.
   d. it is too large a molecule to fit though pores surrounding brain cells.

ANSWER: b

81. What are the two main differences between capillaries in the periphery and capillaries surrounding the brain?
   a. Capillaries surrounding the brain have no pores and are surrounded by membranes of astrocyte cells.
   b. Capillaries surrounding the brain have pores and are surrounded by membranes of astrocyte cells.
   c. Capillaries surrounding the brain have no pores and are not surrounded by membranes of astrocyte cells.
   d. Capillaries surrounding the brain have pores and are not surrounded by membranes of astrocyte cells.

ANSWER: a

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82. A drug that can pass rapidly and easily through the capillary wall surrounding the brain must be:
    a. highly water soluble.
    b. highly lipid soluble.
    c. either highly water soluble or highly lipid soluble.
    d. neither highly water soluble nor highly lipid soluble.

ANSWER: b

83. Why can't steroids and beta blockers pass the blood-brain barrier?
    a. They have low lipid solubility.
    b. They have high water solubility.
    c. They are detected as foreign bodies.
    d. They are readily metabolized.

ANSWER: c

84. Large molecules, such as glucose and vitamins, reach the brain via:
    a. passive diffusion across the cell membrane.
    b. passive diffusion through ion channels.
    c. transcytosis.
    d. All the above.

ANSWER: c

85. *Glucose* is a large molecule reaching the brain by:
    a. passive diffusion across the cell membrane.
    b. passive diffusion through ion channels.
    c. transcytosis.
    d. All the above.

ANSWER: c

86. The membranes that separate fetal blood from maternal blood:
    a. resemble other cell membranes in their general permeability.
    b. are unique in their permeability.
    c. are impermeable to drugs in maternal blood.
    d. are impermeable to lipid-soluble substances.

ANSWER: a

87. The membranes that separate fetal blood from maternal blood are:
    a. highly permeable to psychoactive drugs.
    b. unique in their permeability.
    c. impermeable to psychoactive drugs.

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d. impermeable to water-soluble substances.

ANSWER: a

88. Drug cross the *placental barrier* via _____ with _____-soluble drugs crossing more readily.

a. active transport; water
b. active transport; fat
c. passive diffusion; water
d. passive diffusion; fat

ANSWER: d

89. The presence of the *placental barrier* means that drugs will be _____ in concentration when compared to concentrations in the maternal bloodstream.

a. lower
b. higher
c. similar
d. wildly different

ANSWER: c

90. *Biotransformation* is another term for:

a. distribution.
b. elimination.
c. absorption.
d. metabolism.

ANSWER: d

91. *Metabolism* of a drug refers to the process of:

a. absorption.
b. distribution.
c. detoxification.
d. elimination.

ANSWER: c

92. The molecular breakdown of a drug refers to the process of:

a. metabolism.
b. distribution.
c. absorption.
d. elimination.

ANSWER: a

93. *Biotransformation* is carried out by the _____ and usually makes a drug _____.

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a. kidneys; more fat soluble
b. kidneys; more water soluble
c. liver; more fat soluble
d. liver; more water soluble

ANSWER: d

94. *Biotransformation* is carried out by the:
a. liver.
b. small intestine.
c. kidneys.
d. brain.

ANSWER: a

95. The cytochrome P450 enzyme family in a hepatocyte:
a. is typically capable of metabolizing one, and only one, drug.
b. is typically capable of metabolizing one, and sometimes two, drugs.
c. cannot, without the help of additional enzymes, metabolize a drug.
d. is typically capable of metabolizing a wide variety of drugs.

ANSWER: d

96. Which of the statements regarding *biotransformation* is TRUE?
a. Every drug is metabolized by a unique enzyme found in hepatocytes.
b. Hundreds of enzyme families are involved in drug biotransformation.
c. A few enzyme families are involved in drug biotransformation.
d. One enzyme family carries out all drug biotransformation.

ANSWER: c

97. *Biotransformation* is carried out by the _____. It usually involves making a drug _____ water soluble. The increased ability of this organ to carry out biotransformation after repeated exposure to a drug is termed _____ tolerance. The increased ability of this organ to biotransform drugs other than the one administered previously is termed _____.
a. small intestine; more; metabolic; cross-tolerance
b. kidneys; less; metabolic; cellular-adaptive
c. liver; less; pharmacodynamic; cross-tolerance
d. liver; more; metabolic; cross-tolerance

ANSWER: d

98. Which chemical reaction is NOT related to *P450 enzymes*?
a. hydrolysis

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b. synthesis
c. oxidation
d. reduction

ANSWER: b

99. Oxidation _____ electrons; reduction _____ electrons.
a. removes; removes
b. removes; adds
c. adds; removes
d. adds; adds

ANSWER: b

100. *Hydrolysis* occurs when water is _____, which causes a drug molecule to _____.
a. removed; split
b. removed; grow
c. added; split
d. added; grow

ANSWER: c

101. The first phase of *biotransformation* involves _____; the second phase involves _____.
a. conjugation reactions; cytochrome P450 enzymes
b. conjugation reactions; hydrolysis
c. cytochrome P450 enzymes; conjugation reactions
d. cytochrome P450 enzymes; hydrolysis

ANSWER: c

102. The first phase of *metabolism* involves _____; the second phase involves _____.
a. conjugation reactions; cytochrome P450 enzymes
b. conjugation reactions; oxidation
c. cytochrome P450 enzymes; conjugation reactions
d. cytochrome P450 enzymes; oxidation

ANSWER: c

103. *P450 enzymes* are part of:
a. Phase I reactions.
b. Phase II reactions.
c. conjugation.
d. glucuronidation.

ANSWER: a

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104. *Phase II* reactions involve:
a. P450 enzymes.
b. reduction.
c. conjugation.
d. the kidneys.
ANSWER: c

105. *Phase I* reactions involve:
a. P450 enzymes.
b. capillaries.
c. conjugation.
d. glucuronidation.
ANSWER: a

106. *Conjugation reactions* involve:
a. adding a hydrogen atom.
b. adding water.
c. adding glucuronic acid.
d. P450 enzymes.
ANSWER: c

107. *Glucuronidation* results in:
a. a smaller molecule.
b. a larger molecule.
c. multiple molecules.
d. greater lipid-solubility.
ANSWER: c

108. Alfred has a particularly efficient CYP-2D6 enzyme system in his liver. Based on this information one would predict that Alfred would:
a. be efficient at metabolizing most psychoactive medications.
b. be efficient at metabolizing some psychoactive medications more than others.
c. not be particularly efficient at metabolizing psychoactive medications.
d. have trouble with the biotransformation of many drugs.
ANSWER: b

109. Which of the following factors has the potential to determine how someone will metabolize a drug?
a. genetic
b. environmental

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c. cultural
d. experiential

ANSWER: a

110. When one drug increases the presence of enzymes resulting in the breakdown of another drug, it is known as:
a. glucuronidation.
b. secondary biotransformation.
c. enzyme induction.
d. hydrolysis.

ANSWER: c

111. *Enzyme induction* is initiated by:
a. a drug.
b. P450 enzymes.
c. conjugation.
d. genetics.

ANSWER: a

112. The _____ regulate(s) the levels of most of the substances found in body fluids.
a. liver
b. kidneys
c. enzymes
d. capillaries

ANSWER: b

113. Most of the products of body metabolism are excreted by the:
a. liver.
b. kidneys.
c. intestines.
d. skin.

ANSWER: b

114. The majority of drugs leave the body in:
a. bile.
b. exhalation.
c. sweat.
d. urine.

ANSWER: d

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115. The *kidneys* are made up of functional units called:
a. nephrons.
b. glomerulus.
c. globules.
d. capsules.
ANSWER: a

116. *Nephrons* consist of:
a. capillaries.
b. arteries.
c. veins.
d. enzymes.
ANSWER: a

117. Which list of components is correctly ordered for the flow of fluid through the kidneys?
a. collecting duct; loop of Henle; proximal tubule
b. loop of Henle; proximal tubule; collecting duct
c. proximal tubeul; loop of Henle; collecting duct
d. collecting duct; proximal tubule; loop of Henle
ANSWER: c

118. About 1 liter of plasma is filtered through the nephrons of the kidneys every _____.
a. 30 seconds
b. 1 minute
c. 3 minutes
d. 5 minutes
ANSWER: b

119. Once plasma is filtered through the kidneys, about _____% of the filtered plasma gets reabsorbed.
a. 1
b. 10
c. 50
d. 99
ANSWER: d

120. During kidney filtration, a drug molecule is more likely to be reabsorbed into the bloodstream if the drug molecule is:
a. water soluble.
b. lipid soluble.

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c. small.

d. large.

ANSWER: b

121. The initial decline of drug plasma concentration occurs rapidly due to:

a. first-pass metabolism.

b. an amplified liver response.

c. increased enzyme concentrations.

d. the drug entering body tissues.

ANSWER: d

122. The decline of drug plasma concentration occurs _____ initially and occurs _____during subsequent stages of elimination.

a. slowly; slowly

b. slowly; rapidly

c. rapidly; slowly

d. rapidly; rapidly

ANSWER: c

123. The time for the plasma level of a drug to fall by 50 percent is termed the:

a. distribution.

b. time course.

c. “drug hangover.”

d. elimination half-life.

ANSWER: d

124. The concept of *half-life* is irrelevant to _____ metabolism.

a. alcohol

b. marijuana

c. cocaine

d. nicotine

ANSWER: a

125. The *half-life* of a drug _____ over time.

a. accelerates

b. slows down

c. remains constant

d. fluctuates

ANSWER: c

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126. A drug is, for all intents and purposes, completely eliminated from the body in:

a. one half-life.
b. two half-lives.
c. four half-lives.
d. six half-lives.

ANSWER: d

127. The time to reach *steady-state concentrations* of a drug (the level of drug achieved in blood with repeated, regular-interval dosing) is:

a. dependent upon the actual dosage of drug.
b. achieved when the amount of drug administered per unit time equals the amount eliminated per unit time.
c. independent of dose interval and half-life.
d. reached after one elimination half-life.

ANSWER: b

128. The time to reach *steady-state concentrations* of a drug (the level of drug achieved in blood with repeated, regular-interval dosing) is:

a. dependent upon the actual dosage of drug.
b. achieved when the amount of drug administered per unit time is approximately six times the amount eliminated per unit time.
c. achieved in approximately six times the drug's elimination half-life.
d. reached after one elimination half-life.

ANSWER: c

129. The time to reach *steady-state concentrations* of a drug (the level of drug achieved in blood with repeated, regular-interval dosing) is approximately _____ half-lives.

a. 4
b. 6
c. 8
d. 10

ANSWER: c

130. *Therapeutic drug monitoring* (TDM) involves measuring:

a. enzyme levels.
b. drug plasma concentrations.
c. urine concentrations.
d. rate of metabolism.

ANSWER: b

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131. In *therapeutic drug monitoring* (TDM), drug plasma concentrations correlate well with:
a. enzyme levels.
b. receptor concentrations.
c. urine concentrations.
d. rate of drug elimination.
ANSWER: b

132. The goal of *therapeutic drug monitoring* (TDM) is to obtain the optimal _____.
a. enzyme levels
b. therapeutic window
c. drug tolerance
d. rate of drug elimination
ANSWER: b

133. The increased ability of the liver to carry out *biotransformation* after prolonged exposure to a drug is termed _____ tolerance.
a. pharmacodynamic
b. metabolic
c. enzyme-induction
d. drug-metabolizing
ANSWER: b

134. As _____ levels decrease, *metabolic tolerance* _____.
a. receptor; decreases
b. receptor; increases
c. enzyme; decreases
d. enzyme; increases
ANSWER: c

135. As _____ levels decrease, *pharmacodynamic tolerance* _____.
a. receptor; decreases
b. receptor; increases
c. enzyme; decreases
d. enzyme; increases
ANSWER: b

136. What happens when *metabolic tolerance* increases?
a. The number of receptors decreases.
b. The number of receptors increases.

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c. The amount of enzyme decreases.
d. The amount of enzyme increases.

ANSWER: d

137. What happens when *pharmacodynamic tolerance* increases?
a. The number of receptors decreases.
b. The number of receptors increases.
c. The amount of enzyme decreases.
d. The amount of enzyme increases.

ANSWER: a

138. What happens when *pharmacodynamic tolerance* increases?
a. Receptor sensitivity decreases.
b. Receptor sensitivity increases.
c. The amount of enzyme decreases.
d. The amount of enzyme increases.

ANSWER: a

139. What happens during *metabolic tolerance*?
a. enzyme induction
b. change in receptor sensitivity
c. change in number of receptors
d. down regulation

ANSWER: a

140. What happens during *pharmacodynamic tolerance*?
a. enzyme induction
b. receptor sensitivity changes
c. rate of elimination changes
d. distribution changes

ANSWER: b

141. In terms of tolerance, what happens when enzyme levels decrease?
a. Tolerance of a drug decreases.
b. Tolerance of a drug increases.
c. Number of receptors decreases.
d. Number of receptors increases.

ANSWER: a

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142. In terms of tolerance, what happens when receptor levels decrease?
a. Tolerance of a drug decreases.
b. Tolerance of a drug increases.
c. Amount of enzyme decreases.
d. Amount of enzyme increases.

ANSWER: b

143. *Pharmacodynamic tolerance* occurs in the _____; *metabolic tolerance* occurs in the _____.
a. liver; small intestine
b. liver; synapse/neuron
c. small intestine; liver
d. synapse/neuron; liver

ANSWER: d

144. The reduction in the number or sensitivity of receptors in response to prolonged activation by a drug is termed:
a. down regulation.
b. metabolic tolerance.
c. homeostasis.
d. physical dependence.

ANSWER: a

145. The ability of liver enzymes to degrade a drug more efficiently in the continued presence of the drug is termed:
a. down regulation.
b. metabolic tolerance.
c. homeostasis.
d. physical dependence.

ANSWER: b

146. The ability of receptors in the brain to adapt to the continued presence of a drug is termed:
a. pharmacokinetic tolerance.
b. pharmacodynamic tolerance.
c. metabolic tolerance.
d. physical dependence.

ANSWER: b

147. Once a person becomes *physically dependent* upon a drug:
a. the person needs to take the drug to avoid withdrawal symptoms.

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b. the person will no longer be physically dependent as soon as drug administration is terminated.

c. after stopping drug administration, the person will still be physically dependent but will no longer experience the “abstinence syndrome.”

d. the person will be physically dependent until they come to terms with their “bad” behavior.

ANSWER: a

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Name:_____ Class:_____ Date:_____

TB15 Chapter 1 Essay

1. What are the four processes under *pharmacokinetics*?

ANSWER: 1) absorption, 2) distribution, 3) metabolism, 4) elimination

2. Explain why *prodrugs* are used for oral administration.

ANSWER: Prodrugs undergo chemical conversion to active agent during digestion.

3. What are the possible disadvantages of *oral administration* of drugs?

ANSWER: 1) There can be vomiting and stomach distress; 2) absorption rate can be affected by genetic differences and manufacturing differences; and 3) stomach acid can destroy some drugs.

4. What are the disadvantages of *rectal administration* of drugs?

ANSWER: Absorption can be irregular, unpredictable, and incomplete, and many drugs irritate lining of rectum.

5. Discuss the two reasons why *inhalation* allows for quick absorption.

ANSWER: 1) The lungs have a large surface area; 2) lung capillaries feed directly to the heart via the pulmonary vein.

6. Present three examples of drugs that can be administered through *mucous membranes* and their exact absorption routes.

ANSWER: 1) cocaine powder sniffed via nose; 2) fentanyl in lollipop form (via mouth) for pain management in children; 3) sublingual (under tongue) combination of buprenorphine and naloxone for opioid dependency

7. Present five examples of drugs that can be administered through *transdermal patches* and their purpose.

ANSWER: 1) nicotine to deter smoking; 2) fentanyl for chronic pain; 3) clonidine for hypertension; 4) estrogen for contraception; 5) scopolamine for motion sickness

8. Explain why *lipid solubility* is not a factor for a drug molecule to cross the membrane of a capillary outside the brain.

ANSWER: Molecules move freely across through pores that are large enough for most drug molecules.

9. Describe the structural features of the *blood-brain barrier*.

ANSWER: capillary and glial sheath (astrocyte); tight junctions; molecule size and lipid solubility

10. Discuss why it is essential to track the *time course of drug action* and its pharmacological effects.

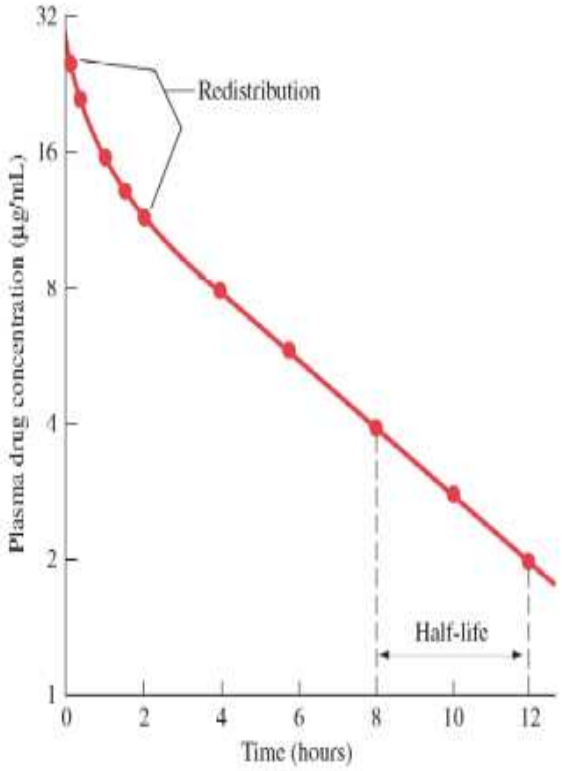
ANSWER: 1) predicting optimal dosage and intervals; 2) maintaining therapeutic drug level; and 3) determining time needed to eliminate drug.

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TB15 Chapter 1 Essay

11. Describe what is shown in the figure below (Fig. 1.10 in textbook). Also, explain why the slope of the plot is steeper during the redistribution phase and why it is shallower later in time.



ANSWER: Time course of plasma concentration of a drug; redistribution is when drug leaves blood, enters tissue. After redistribution plasma concentration decreases linearly via metabolism.

12. How many *half-lives* does it take to reach a "steady-state" plasma concentration? Show the calculations to demonstrate this effect.

ANSWER: 5-6 half-lives.

# half-lives	% drug eliminated	% drug remaining
0	0	100
1	50	50
2	75	25
3	87.5	12.5
4	93.8	6.25
5	96.9	3.1
6	98.4	1.55

13. Differentiate among metabolic tolerance, pharmacodynamic tolerance, behavioral tolerance, and cross-tolerance.

ANSWER: Metabolic and pharmacodynamic tolerance relate to the amount of enzyme and receptors available. Behavioral conditioning processes are not accounted for by enzyme and receptor levels. Cross-

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tolerance occurs when one drug affects the tolerance of other drugs.

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