Please choose the BEST answer of those provided. For numerical answers, choose “none of the above” if your answer is not within ± 5% of the correct answer. Place your answers on the scantron sheet provided.

For a single extravascular dose of a drug that exhibits monoexponential disposition and first order absorption, how do the following changes in absorption or disposition kinetics affect $T_{\text{max}}$, $C_{\text{max}}$ and $\text{AUC}$.

1. $\text{Cl}_\text{p}$ is decreased, $V_d$ unchanged, absorption kinetics are unchanged.
   (a) $T_{\text{max}}$ = decreased, $C_{\text{max}}$ = decreased, $\text{AUC}$ = decreased
   (b) $T_{\text{max}}$ = increased, $C_{\text{max}}$ = unchanged, $\text{AUC}$ = unchanged
   (c) $T_{\text{max}}$ = unchanged, $C_{\text{max}}$ = increased, $\text{AUC}$ = increased
   (d) $T_{\text{max}}$ = increased, $C_{\text{max}}$ = increased, $\text{AUC}$ = increased
   (e) none of the above

2. $F$ is increased, $k_a$ unchanged, Dose unchanged, disposition kinetics ($\text{Cl}_\text{p}$, $V_d$, $k$) unchanged.
   (a) $T_{\text{max}}$ = decreased, $C_{\text{max}}$ = unchanged, $\text{AUC}$ = unchanged
   (b) $T_{\text{max}}$ = decreased, $C_{\text{max}}$ = decreased, $\text{AUC}$ = decreased
   (c) $T_{\text{max}}$ = unchanged, $C_{\text{max}}$ = increased, $\text{AUC}$ = increased
   (d) $T_{\text{max}}$ = increased, $C_{\text{max}}$ = increased, $\text{AUC}$ = increased
   (e) none of the above

3. $V_d$ unchanged, $\text{Cl}_\text{p}$ unchanged, $F$ is unchanged, $k_d$ decreased, Dose unchanged
   (a) $T_{\text{max}}$ = decreased, $C_{\text{max}}$ = decreased, $\text{AUC}$ = decreased
   (b) $T_{\text{max}}$ = increased, $C_{\text{max}}$ = unchanged, $\text{AUC}$ = decreased
   (c) $T_{\text{max}}$ = increased, $C_{\text{max}}$ = increased, $\text{AUC}$ = unchanged
   (d) $T_{\text{max}}$ = decreased, $C_{\text{max}}$ = increased, $\text{AUC}$ = increased
   (e) none of the above

4. If the volume of distribution is less than 5 L, the drug is most likely to be distributed to the:
   (a) Extracellular compartments
   (b) Tissues
   (c) Vascular compartment
   (d) None of the above

5. Which of the following is true?
   (a) $\alpha$ is the absorption rate constant.
   (b) $\alpha$ is the terminal half-life of a two-compartment model.
   (c) $\alpha$ is the terminal elimination rate constant of a two-compartment model.
   (d) Rate-limiting absorption kinetics occurs when the rate of elimination, $k$, is much greater than the rate of absorption, $k_a$.
   (e) All of the above statements are false.
6. The elimination half-life for ciprofloxacin, Cipro, \((F = 0.6)\) is approximately 4 hours. What amount of this drug \textit{will be eliminated} in 16 hours after an IV bolus dose of 750 mg?

(a) 703 mg  
(b) 422 mg  
(c) 94 mg  
(d) 47 mg  
(e) 28 mg

7. \textit{How long} will it take for 300 mg of ciprofloxacin to decompose by 30%? \(k = 0.173/\text{hr}\) (Assume first-order kinetics and constant temperature.)

(a) 1.2 hr  
(b) 2.1 hr  
(c) 3.5 hr  
(d) 520 hr  
(e) None of the above

8. \textit{How much} drug in question #6, \textit{will be remaining} in a patient 8 hrs after a 250 mg oral ciprofloxacin dose.

(a) 188 mg  
(b) 113 mg  
(c) 63 mg  
(d) 38 mg  
(e) None of the above

Use the following information to answer question 9.

Misoprostol (Cytotec, GD Searle) is a synthetic prostaglandin E\(_1\) analog. According to the manufacturer, the following information was obtained when a 200 µg oral dose of misoprostol was taken with an antacid or high fat breakfast:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cmax (pg/mL)</th>
<th>AUC (pg*hr/mL)</th>
<th>Tmax (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>fasting</td>
<td>811</td>
<td>417</td>
<td>14 ± 8</td>
</tr>
<tr>
<td>with antacid</td>
<td>689</td>
<td>349</td>
<td>20 ± 14</td>
</tr>
<tr>
<td>with high fat breakfast</td>
<td>303</td>
<td>373</td>
<td>64 ± 79</td>
</tr>
</tbody>
</table>

9. What is \textit{relative bioavailability} of the antacid to the fasting conditions \((F_a/F_f)\)?

(a) 1.19  
(b) 0.84  
(c) 0.90  
(d) not enough information is given.  
(e) none of the above
For questions #10 – 12, use the following information:

Lidocaine is effective in most patients when its plasma concentration exceeds 1.5 mg/L but results in unacceptable toxicity when the plasma concentration exceeds 6 mg/L. The equation that best describes the elimination kinetics of lidocaine following a 150 mg iv dose is:

\[ \text{Cp} = 1.98 \mu g/\text{mL} e^{-(0.419/hr)\times t} \]

10. What is the elimination t\(_{1/2}\) for lidocaine in this patient?
   (a) 1.65 hr
   (b) 1.45 hr
   (c) 0.32 hr
   (d) 4.56 hr
   (e) None of the above

11. The Cl\(_p\) for lidocaine in this patient is:
   (a) 0.423 L/hr
   (b) 15.87 L/hr
   (c) 28.71 L/hr
   (d) 31.75 L/hr
   (e) None of the above

12. What is the greatest i.v. bolus dose that can be administered without producing toxicity?
   (a) 190 mg
   (b) 350 mg
   (c) 450 mg
   (d) 600 mg
   (e) None of the above

Use the following information to answer questions 13 through 15.

Park and associates (1983) studied the pharmacokinetics of amrinone after a single i.v. bolus injection (75 mg) in 14 healthy adult male volunteers. The pharmacokinetics of this drug followed a two-compartment open model and the equation best describing amrinone kinetics in humans was:

\[ \text{Cp} = 4.62 \mu g/\text{mL} e^{-(8.94/hr)\times t} + 0.64 \mu g/\text{mL} e^{-(0.19/hr)\times t} \]

13. Estimate the initial concentration following the iv bolus dose of amrinone.
   (a) 5.26 \mu g/mL
   (b) 4.62 \mu g/mL
   (c) 3.65 \mu g/mL
   (d) 0.64 \mu g/mL
   (e) None of the above

14. Estimate the Area Under the Curve of amrinone.
   (a) 1.73 \mu g hr/mL
   (b) 3.10 \mu g hr/mL
   (c) 3.88 \mu g hr/mL
   (d) 24.4 \mu g hr/mL
   (e) None of the above

15. What is the plasma level of amrinone 20 minutes after the i.v. dose?
   (a) 0.06 \mu g/mL
   (b) 0.53 \mu g/mL
   (c) 0.84 \mu g/mL
   (d) 4.94 \mu g/mL
   (e) None of the above
For questions 16 and 20, please use the information below:

Noroxin® (norfloxacin) is primarily used for lower respiratory tract infections and urinary tract infections. Noroxin® is available in 400 -mg film-coated tablets and is usually administered every 12 hrs. Norfloxacin has the following pharmacokinetic parameters: \( F = 0.35, \; \text{fe} = 0.29, \; V_d = 3.2 \text{ L/kg}, \) and \( t_{1/2} = 5 \text{ hrs} \). Assume first-order absorption and elimination kinetics and that the absorption is instantaneous relative to the elimination.

16. A 62 kg female patient is given an I.V. infusion at an infusion rate, \( R_o \), of 40 mg/hr for 30 hrs for her urinary tract infection. At what time will steady state occur?
   (a) 5 hrs
   (b) 10 hrs
   (c) 20 hrs
   (d) 25 hrs
   (e) None of the above

17. What is the EQUATION needed to determine the plasma concentration, \( C_p \), at 18 hrs for the patient in question #16?
   (a) \( C_p = C_p^0 e^{-kt} \)
   (b) \( C_p = C_p^0 [1 - e^{-kt}] \)
   (c) \( C_p = C_p^0 e^{-kt} + C_p^s (1 - e^{-kt}) \)
   (d) \( C_p = A e^{-at} - B e^{-ft} \)
   (d) None of the above

18. What is the plasma concentration, \( C_p \), at 18 hrs for the patient in question #16?
   (a) 1.45 mg/L
   (b) 1.33 mg/L
   (c) 1.02 mg/L
   (d) 0.12 mg/L
   (e) None of the above

19. What is the plasma concentration, \( C_p \), at 34 hrs for the patient in question #16?
   (a) 7.17 mg/L
   (b) 0.832 mg/L
   (c) 0.116 mg/L
   (d) 0.013 mg/L
   (e) None of the above

20. If the patient in question #16 only received an oral 800 mg loading dose of Noroxin® (no iv infusion), what will the plasma concentration of norfloxacin, \( C_p \), be at 13 hrs for the patient?
   (a) 41.04 mg/L
   (b) 14.36 mg/L
   (c) 0.662 mg/L
   (d) 0.232 mg/L
   (e) None of the above