Name: _______________________________
UFID: _______________________________

Version B

PHA 5128
Answer First Exam
Spring 2005

On my honor, I have neither given nor received unauthorized aid in doing this assignment.

____________________________________
Name
1. Make a dosing recommendation for chronic use of a drug with a total body clearance of 50 mL/min and a volume of distribution of 50 L. The drug is completely and rapidly absorbed. The therapeutic range is 10-20 $\mu$g/ml. You have 250 mg tablets available to dispense.

A: 2 tablets q 6 hours
B: **2 tablets q 12 hours**
C: 1 tablet q 8 hours
D: 2 tablets q 8 hours
E: 1 tablet q 12 hours
2. How will an increase in tissue binding affect the clearance (CL), bioavailability (F), and half-life (\( t_{1/2} \)) of a low-extraction drug? (please note that \( \leftrightarrow \) means no change)

A: ↑ CL, ↓ F, ↓ \( t_{1/2} \)
B: \( \leftrightarrow \) CL, \( \leftrightarrow \) F, ↑ \( t_{1/2} \)
C: \( \leftrightarrow \) CL, ↑ F, \( \leftrightarrow \) \( t_{1/2} \)
D: ↓ CL, \( \leftrightarrow \) F, ↑ \( t_{1/2} \)
E: ↑ CL, ↑ F, ↓ \( t_{1/2} \)
3. A 72 kg patient receives 1000 mg theophylline i.v. by bolus injection every 12 hr.
Assume that $V_d = 0.5$ L/kg and $t_{1/2} = 6.2$ h. Predict the steady state peak concentration and trough concentrations.

A. Peak: 37.9 mg/mL  Trough: 10.13 mg/mL
B. Peak: 7.42 mg/L  Trough: 1.98 mg/L
C. Peak: 10.13 mg/L  Trough: 2.71 mg/L
D. Peak: 37.9 mg/L  Trough: 10.13 mg/L
E. Peak: 2729 mg/L  Trough: 730 mg/L
4. What are the two pharmacokinetic parameters that are evaluated in a bioequivalence study whose log-transformed ratios (test:reference) must pass the two one-sided test about the 90% confidence intervals?

A: Clearance and Volume of distribution  
B: Clearance and AUC  
C: AUC and half-life  
D: $T_{\text{max}}$ and AUC  
E: $C_{\text{max}}$ and AUC
5. The following data was obtained after oral administration of various drugs. Determine the relative bioavailability of drugs 1 and 2 to the reference drug.

<table>
<thead>
<tr>
<th>Product</th>
<th>Dose (mg)</th>
<th>Tmax (h)</th>
<th>Cmax (mg dL⁻¹)</th>
<th>Total AUC (mg dL h⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>500</td>
<td>4.1</td>
<td>10.3</td>
<td>6.39</td>
</tr>
<tr>
<td>Drug 1</td>
<td>500</td>
<td>4.2</td>
<td>11.2</td>
<td>5.91</td>
</tr>
<tr>
<td>Drug 2</td>
<td>500</td>
<td>4.8</td>
<td>8.3</td>
<td>6.69</td>
</tr>
</tbody>
</table>

A: Drug 1: 0.96, Drug 2: 1.08
B: **Drug 1: 0.92, Drug 2: 1.05**
C: Drug 1: 0.81, Drug 2: 1.09
D: Drug 1: 1.05, Drug 2: 0.92
E: Drug 1: 1.1, Drug 2: 0.82
6. T.G (49 yo man, 65 kg) is to be started on lidocaine therapy. Lidocaine has a total body clearance of 9.2 ml/kg/minute. What zero-order infusion rate would be needed to induce a steady-state concentration of 10 µg/ml?

A: 92 µg/min
B: 6000 µg/min
C: 120 µg/min
D: 92 mg/min
E: 6000 mg/min
7. I.P. is admitted to the hospital after a major auto accident. At admission he weighed 96kg, and is 6’2”. The day following surgery I.P. weighs 100kg and is suffering from an infection. At 10:00 am he is given a half an hour infusion of 350mg of amikacin. Predict his volume of distribution.

A. 21.9 L  
B. **28.0 L**  
C. 22.3 L  
D. 25.0 L  
E. 26.3 L
8. W.G. is a 5’ 4”, 72 kg, 30 year old female who suffered a severe burn that has since been infected by S. aureus. To treat her infection she is given 150mg of gentamicin by a half hour infusion every 6 hours. She is given an infusion starting at 8:00 am. At 9:00 am a plasma sample is taken and yields a Cp\(_{max}\) of 10.2 µg/ml. Another sample is taken at 1:30 pm to give a Cp\(_{min}\) of 1.4 µg/ml. Calculate the Vd for W.G.

A. 14.8 L  
B. 10.1 L  
C. 15.3 L  
D. 12.6 L  
E. 11.4 L
G.W., a 40 year old, 70kg man, is receiving 100 mg of tobramycin infused IV over a 30 minute period every 8 hours. His serum creatinine has increased from 1mg/dl to 2mg/dl over the past 24 hours. Because his renal function appears to be decreasing, three plasma samples were obtained to monitor serum gentamicin concentrations as follows: just before a dose, 1 hour after the start of the same dose, and 8 hours after the start of that dose (two troughs and one peak level). The serum gentamicin concentrations at these times were 1mg/L, 9mg/L, and 3mg/L.

9. What is the half-life of tobramycin for G.W.?

A. 2.5 h  
B. 2.2 h  
C. 5.1 h  
D. **4.4 h**  
E. 1.8 h
G.W., a 40 year old, 70kg man, is receiving 100 mg of tobramycin infused IV over a 30 minute period every 8 hours. His serum creatinine has increased from 1mg/dl to 2mg/dl over the past 24 hours. Because his renal function appears to be decreasing, three plasma samples were obtained to monitor serum gentamicin concentrations as follows: just before a dose, 1 hour after the start of the same dose, and 8 hours after the start of that dose (two troughs and one peak level). The serum gentamicin concentrations at these times were 1mg/L, 9mg/L, and 3mg/L.

10. Calculate the volume of distribution of tobramycin for G.W. using the following equation:

\[
V_d = \frac{\text{DOSE}}{k \times T} \times \frac{1 - e^{-k \times T}}{(C_{\text{max}} - C_{\text{min}} \times e^{-k \times T})}.
\]

What values for \(C_{\text{max}}\) (mg/L) and \(C_{\text{min}}\) (mg/L) should be used to make the calculation?

A. \(9, \ 1\)
B. \(9.7, \ 3\)
C. \(9, \ 3\)
D. \(9.7, \ 1\)
E. \(10.5, \ 3\)
11. H.L., 65 year old, 50kg woman with a serum creatinine of 0.5mg/dl, has been empirically started on 500mg of vancomycin every 8 hours for treatment of a staphylococcal infection. What is the expected peak vancomycin concentration for H.K at steady state?

A. 17.2 mg/L
B. **19.8 mg/L**
C. 21.4 mg/L
D. 26.5 mg/L
E. 23.2 mg/L
12. A 35 year old female patient (65kg, SeCr 0.7 mg/dL) is treated with 100mg gentamicin TID infused over 30 minutes. Assuming normal pharmacokinetics (Vd = 0.25L/kg, Cl = CLcr) predict the measured peak concentration one hour after the infusion was started and the measured trough concentration one half hour before the next infusion at steady state.

A. 5.8 mg/L, 0.29mg/L  
B. 4.7 mg/L, 0.19 mg/L  
C. 5.8 mg/L, 0.19 mg/L  
D. 4.7 mg/L, 0.29 mg/L  
E. 5.4 mg/L, 0.23 mg/L