PHAR 750 Quiz II - A

PHAR 750: Biopharmaceutics/Pharmacokinetics
October 17, 2006
Name: Key-A Quiz II
Total 25 points

Please use the information provided to answer questions 1 – 5. Circle your final answers.

\[
A. \quad C_p = 3.0 \frac{mg}{L} e^{-\frac{0.26}{hr} t}
\]

\[
B. \quad C_p = 12 \frac{\mu g}{mL} e^{-\frac{5.8}{hr} t} + 18 \frac{\mu g}{mL} e^{-\frac{0.16}{hr} t}
\]

1. Which of the above equations (A, B, or both) is/are first-order elimination kinetics? (3 points)
   \[\boxed{A+B}\]

2. Which of the above equations (A, B, or both) is/are a one-compartment model? (3 points)
   \[\boxed{A}\]

3. Calculate the elimination half-life for equation A? (3 points).
   \[
   t_{1/2} = \frac{0.693}{0.26/hr} = 2.67/hr
   \]

4. Calculate the elimination half-life for equation B? (3 points).
   \[
   t_{1/2} = \frac{0.693}{0.16/hr} = 4.33/hr
   \]

5. For Equation A, a 50 mg iv bolus dose was administered and 64% of the drug is excreted unchanged in the urine.

   a. What is the area under the curve, AUC\(_{0-\infty}\)? (4 points).
   \[
   AUC_{0-\infty} = \frac{C_p^0}{k} = \frac{3.0 \frac{mg}{L}}{0.26/hr} = 11.54 \frac{mg}{L \cdot hr}
   \]

   b. What is the renal clearance, Cl\(_r\)? (5 points)
   \[
   Cl_r = \frac{f_e \cdot Cl_p}{V_d} = \frac{(0.64)(4.33 L/hr)}{16.67 L} = 2.77 L/hr
   \]
Use this table to answer question #6.

**Data following data was obtained after a 500 mg of a drug in solution by different routes.**

<table>
<thead>
<tr>
<th>Route</th>
<th>Plasma Data</th>
<th>Urine Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AUC (mg*hr/L)</td>
<td>Half-life (min)</td>
</tr>
<tr>
<td>Intravenous</td>
<td>7.6</td>
<td>190</td>
</tr>
<tr>
<td>Intramuscular</td>
<td>7.4</td>
<td>185</td>
</tr>
<tr>
<td>Oral</td>
<td>3.5</td>
<td>193</td>
</tr>
</tbody>
</table>

6. What is the **absolute bioavailability** of the I.M. formulation, $(F_{im}/F_{iv})$ from PLASMA data? (4 points)

\[
\frac{F_{im}}{F_{iv}} = \frac{\text{Dose}_{iv}}{\text{Dose}_{im}} \cdot \frac{\text{AUC}_{im}}{\text{AUC}_{iv}} = \frac{7.4 \text{mg/L/hr}}{7.6 \text{mg/L}} = 0.974
\]