PHA 5127 Dose Optimization I

Homework I (10 points)

Due on Friday, 09/11/2009

1. **500 mg Drug A was administered to a male patient (80 kg, 35 years old) through IV bolus injection. The following plasma concentrations (Cp) were observed. (4.75 points)**

time (h)	Cp (µg/mL)
1	0.794
3	0.500
6	0.250
11	0.079

a) Plot Cp vs. time and determine the order of the elimination process **(0.75 points)**
b) Determine k_e and $t_{1/2}$ (half life) **(1 point)**
c) Estimate the initial concentration C_0 and the volume of distribution (Vd) **(1 point)**
d) Calculate $AUC_{0\text{-}t(last)}$ and $AUC_{0\text{-}\infty}$ **(1 point)**
e) Calculate $\frac{AUC_{0-t(last)}}{AUC_{0-\infty}} * 100\%$ **(0.5 points)**
f) Predict the plasma concentration after 9 hours **(0.5 points)**

2. **For first-order elimination process, derive that the half-life ($t_{1/2}$) is independent of C_0 (1 point)**

3. **Describe the fate of a drug after its administration (assume that a tablet has been administered orally). Hint: LADME (1.25 points)**

4. **TRUE (T) or FALSE (F) (3 points, 0.5 points for each question)**

The plasma concentration time profile of a certain drug is not dependent on the dosage form

T F

For a zero-order elimination process the half-life is dependent on the plasma concentration at time point 0 (C_0)

T F

Therapeutic drug level monitoring (TDM) can be useful to optimize the dosage regimen for an individual patient

T F

Drugs with a low volume of distribution (Vd) have a narrow therapeutic window

T F

In the case of permeability limited distribution, the blood flow determines the rate of uptake

T F

In the case of perfusion limited distribution, the blood flow is not important for the rate of uptake

T F