

Case Study VI
Fall 2005

1. A 65-year-old, 75 kg, 5'8" tall male patient X with a serum creatinine of 1.3mg/dL, is about to receive drug X orally (assume: absorption is so fast that we can use IV bolus model). Design a dosing regimen (calculate dosing interval, dose, average concentration) that will produce a steady-state peak concentration of 15mg/L and a steady-state trough concentration of 9mg/L. How would you give the drug if only tablets of 200mg are available? Show all calculations. (Assume $V_d=0.6L/kg$, $CL=CrCL$)

2. Drug Y was given ORALLY to two patients, A and B, respectively. As reported from literature, drug X follows first order absorption and elimination. Please find out if the following statements are correct or not. (Assume the other pharmacokinetic parameters are the same)

1.) If the dose for patient A is 200 mg and the dose for patient B is 400 mg, then T_{max} for A is larger than that for patient B. **T F**

2.) Because patient A has chronic GI tract disease, K_a for patient A is 0.25 hr^{-1} , whereas the K_a value for patient B is 0.5 hr^{-1} , then the average steady state concentration for patient A is lower than that of patient B. **T F**

3. A 60-kg patient is begun on a continuous intravenous infusion of theophylline at 40 mg/hr (based on theophylline, not aminophylline). Forty-eight hours after beginning of the infusion, the plasma concentration is 15 mg/L.

a. If we assume that this concentration is at steady state, what is the theophylline clearance.

b. If the volume of distribution is estimated to be 30 L, what is the half-life?

c. What would the plasma concentration be 10 hr after beginning the infusion.

d. If the infusion is continued for 3 days and then discontinued, what would the plasma concentration be 12 hours after the stop of the infusion.

4. A 58 kg patient is started on 80 mg of gentamycin and is given as 1-hr infusion every 6 hr. If this patient is assumed to have an "average" volume of distribution (value of the population mean) of 0.25 L/kg and a normal half-life of 3 hr, what would be the peak plasma concentration at steady state (the true C_{max} value)? Is the 6 hr dosing interval sufficient to achieve a fluctuation of not more than 6.