PHA 5127 – Fall 2006
Case study # 7
Question sheet

#1: What do the following parts of the equation describe?

$$Cp_{\min} = \frac{k_o}{k_e \bullet V_d} \frac{(1-e^{-k_e t})(1-e^{-n^* k_e \tau})}{1-e^{-k_e \tau}} \; e^{-k_e t'}$$

a) $$\frac{k_o}{k_e \bullet V_d}$$

b) $$(1-e^{-k_e t})$$

c) $$\frac{(1-e^{-n^* k_e \tau})}{1-e^{-k_e \tau}}$$

d) $$e^{-k_e t'}$$

#2: B.F. is given the infusion you recommended at 8:00 am. At 9:00 am a plasma sample is taken and yields a Cp^*_{max} of 9.2 µg/ml. Another sample is taken one half hour before the next infusion to give a Cp^*_{min} of 2.4µg/ml. Calculate the actual ke and Vd for B.F. and recommend a dosing change to give a true C_{max} of 7.5µg/m. What is the new true C_{min} expected with this dosing change. Assume that tau is 8 hours, dose is 120 mg, and the infusion time is 0.5 hours.

#3: Theophylline has a desired steady state concentration around 15 mg/L to achieve therapeutic effect, and the average half-life of theophylline is about 4 hr, and the apparent volume of distribution is about 25 L (assume one compartment and linear kinetics). If a patient receives an intravenous dose of theophylline 240 mg over 4 hours every 12 hr. Is it possible to get therapeutic effect based on current dose regimen? If yes, why can it be? If not, what kind of dose regimen will be proposed?

#4: A patient with pulmonary infection is going to begin multiple 30-minute intravenous infusion of gentamicin. The target clinical peak (1-hour after the infusion start) and clinical trough (30-minute before the next infusion) at steady state are 10mg/L and 1mg/L respectively. If the patient is assumed to have first-order kinetics with Ke of 0.35 hr^{-1}:

a) How often should we give the drug to the patient (QD, BID, TID or QID)?

b) If the patient has a Vd of 18 L, what is the daily dose we should give to this patient?

c) How long will it take to reach steady state?