PHA 5127 Dose Optimization I Homework 6, 2013

Please provide all answers with their appropriate units. 0.5 points will be deducted for each missing or inappropriate unit. Please show how you got your answers. No points will be given for incorrect answers if no solution approach is shown.

1. A male patient is to be started on a continuous intravenous infusion. To achieve an immediate effect, a loading dose is administered as an IV bolus. The continuous infusion is started right after the loading dose is administered. The desired steady state concentration is 20 mg/L. The volume of distribution is 35 L and the clearance is 10 L/hr.

   A. Please calculate the loading dose (1pt).
   B. Please calculate the maintenance dose (infusion rate) (1pt).
   C. How long until at least 95% steady state is reached? (1pt)
   D. The patient receives the continuous infusion for 5 days before it is stopped. Please calculate the concentration 5 hours after the infusion is stopped (1pt).
   E. It is decided that the infusion should be restarted when the concentration equals 15 mg/L. How long after the stop of the infusion should it be restarted (1pt)?

2. You wish to begin a patient on an oral formulation of drug Y and to maintain an average plasma drug concentration of 20 mg/L. The volume of distribution and elimination rate constant is estimated to be 10 L and 0.3 hr^{-1} in this patient, respectively.

   A. If the fraction of drug absorbed is assumed to be 0.9 and the drug is to be given every 12 hours, what dose should be administered? (1pt)
   B. After 5 days, the average steady-state plasma concentration is measured as 13 mg/L. What is the patient's actual drug clearance? (1pt)

3. 200 mg of drug Y is given orally to a 75 kg male patient. Two tablets (A and B) are available. K_a is 0.5 hr^{-1} for A and 0.25 hr^{-1} for B. All other pharmacokinetic parameters are the same. Please select the correct answer from the choices given below.

   A. t_{max} for A is (longer, equal, shorter) than/to t_{max} for B (1pt)
   B. C_{max} for A is (higher, equal, lower) than/to C_{max} for B (1pt)
   C. AUC_∞ for A is (larger, equal, smaller) than/to AUC_∞ for B (1pt)