PHA 5128
Fall 2004
HW 4

1. The disposition kinetics of a drug after IV bolus injection is described by a one-compartment model. Assume the half life following therapeutic doses in humans is 4hr, therefore:

    a. What is its elimination rate constant?
    b. How long does it take to eliminate 75% of the dose after injection of 5 mg.
    c. How long does it take to eliminate 75% of the dose after injection of 1 mg.

2. A patient with liver failure was given 70mg of a drug as an IV bolus injection. The plasma concentrations at 3 hours and 8 hours after injection were 1.31mg/L and 0.65mg/L respectively. The drug is eliminated by hepatic metabolism and renal excretion via glomerula filtration. The plasma protein binding for the drug is 50%.. What is the hepatic clearance and the volume of distribution of this drug in this patient? (Use 130ml/min for glomerula filtration rate).

3. A 22 year old male patient (80kg, 66inches) was given 2mg/kg of an aminoglycoside by IV bolus injection. The serum creatinine level of the patient is 1.5mg/dL. Assume that the clearance of this drug equals the creatinine clearance.

    a. Calculate the creatinine clearance of this patient.
    b. Blood samples were taken 1hour after the dose, and the plasma concentration was 7.5mg/L. How long will it take for the plasma level to reach 2mg/L?

4. True or False:
    a. If k_e decreases for a drug, its AUC(0-inf) will always increase.

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    b. Two drugs, given as an IV bolus injection, follow a one compartment body model. They do not show drug/drug interactions and their elimination rate constant were the same. Therefore their concentration-time profiles will be identical

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    c. A patient with liver failure (decrease liver blood flow) was given an IV bolus of drug X (high extraction drug). This drug follows a one compartment body model and is heavily metabolized in the liver. Compared with normal people, this patient would have a much smaller starting concentration and much longer half life for this drug.

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    d. A drug was given to patient A by IV bolus. The same dose was given to patient B also by iv bolus. Patient B shows a much higher plasma protein binding for the drug than patient A. If they have the same clearance for this drug, the AUC(0-inf) for both patients will be the same.

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