

PHA5127 – Fall 2005
Homework #1

Please show your calculations and make sure your numerical answers have units!

1. 500 mg of drug A was administered to a patient as a single i.v. bolus dose. The following plasma concentrations were observed.

Time (hrs)	Conc. (mg/L)
0.5	3.2
1	3.0
5	2.2
10	1.6
15	1.0

Calculate the following parameters of the drug based on the above plasma concentrations:

- a. Elimination rate constant
 - b. Half-life
 - c. Initial plasma concentration
 - d. Volume of distribution
 - e. Based on the volume of distribution. Is the drug being distributed exclusively to the extracellular fluid? Yes/No. Give a reason for your answer.
 - f. $AUC_{0 \text{ to } \infty}$ using trapezoidal rule
2. a. Define perfusion limited distribution.
b. What types of drugs will have this type of distribution into tissue?
c. The distribution for perfusion-limited drugs depends on what?
d. Which organ would a higher rate of uptake of perfusion-limited drugs: Liver or skin? Why?
3. 200 mg of drug B was administered and the following plasma concentrations were observed:

Time (hrs)	Conc. (mg/L)
2	180
5	150
10	100

- a. Is this drug eliminated by first-order or zero-order process? Give a reason for your answer.

Calculate the following parameters of the drug based on the above plasma concentrations:

- b. Initial plasma concentration
- c. Plasma concentration at $t = 20$ hrs

- d. Does the rate of decrease in plasma concentration of this drug depend on the concentration? Why?
4. Which of the following is true about the volume of distribution, V_d :
 - a. It indicates the extend of drug distribution into tissue.
 - b. The larger the V_d , the lower the amount of drug found in the plasma.
 - c. For a drug that can cross membranes easily, the plasma binding is stronger than the tissue binding for a particular drug. So the V_d for this drug is less than 41L.
 - d. An increase in the plasma protein binding will result in a lower V_d .
 - e. If the V_d of a small lipophilic drug is 18L, it can be assumed to distribute only to the extracellular fluid.