

Case Study 2 Spring 2006

1. The volume of distribution of diazepam in a group of normal subjects (60 kg, ideal body weight) was found to be 105 L. In another group of patients (110 kg), the volume of distribution was found to be 305 L. Derive an equation that allows estimation of the volume of distribution based on ideal and actual body weight.
2. Based on the Cockcroft-Gault-Equation, calculate the amount of creatinine that is produced every hour from muscle in a normal 30 year old and 75 year old male subject (body weight 70 kg) with a serum creatinine of 1 mg/dl.
3. J.R., is a 65-year-old, 65kg patient with a serum creatinine of 1.0mg/dL. For several weeks he received tablets of 375 µg of digoxin per day to treat his CHF. Assume that this patient cannot take anything by mouth anymore and he must be converted to daily intravenous doses of digoxin. Calculate an intravenous dose equivalent to the 375 µg tablets he ingests daily.
4. Oxazolidinone antibiotics are a new synthetic class of antibacterial agents. The FDA recently approved Linezolid, an oxazolidinone antibiotic. Administration of this antibiotic may cause gastrointestinal distress that is eliminated when taken with food. However, the presence of food may reduce bioavailability. Given the following data, determine the absolute bioavailability of 375 mg Linezolid tablets with and without food. Does food affect bioavailability?

Time [hrs]	C _p i.v.[µg hr/ml]	C _p oral [µg/ml]	C _p after food
			oral [µg/ml]
0.000	9.375	0.000	0.000
0.200	9.007	1.222	1.024
0.600	8.315	3.017	2.550
1.000	7.676	4.156	3.542
2.000	6.284	5.270	4.574
3.000	5.145	5.154	4.535
4.000	4.212	4.596	4.086
6.000	2.824	3.296	2.967
8.000	1.893	2.253	2.039
12.000	0.850	1.020	0.927
14.000	0.570	0.684	0.622

5. Given the data below for two prednisolone tablet formulations, are these products bioequivalent? What pharmacokinetic criteria did you use to draw this conclusion?

	Product A	Product B	Ratio (%) A/B	90% Confidence Limits
AUC _{0-15 h} ($\mu\text{g min/mL}$)	204.5	216	94.7	91.2-98.2
AUC _{0-∞} ($\mu\text{g min/mL}$)	212	222	95.5	88.6-102.4
C _{MAX} (ng/mL)	1020	1053	96.9	90.8-103.0
T _{MAX} (h)	39.6	52.8	75.0	
T _{1/2} (min)	186.2	170.4	109.3	