

PHA 5128

Case Study III

1. S.T., a 32-year-old, 64 kg female with a serum creatinine of 0.9 mg/dL is to be given tobramycin. Calculate a maintenance dose which will produce a “peak” concentration of 7 mg/L one hour after the half-hour infusion has been started, and a trough concentration of 1 mg/L. Assume that the tobramycin will be administered as a one-half hour infusion. If S.T. was to be given tobramycin 5 mg/kg QD, what would be the calculated steady-state peak concentration one hour after starting the half-hour infusion? Also predict subsequent steady-state plasma concentration 12 hours after starting the infusion and at the trough.
2. L.F., a 28-year-old, 75 kg male, is receiving 100 mg of tobramycin infused IV over 30 minute period q8h. His serum creatinine has increased from 1 mg/dL to 1.8 mg/dL over the past 24 hours. Since his renal function appears to be decreasing, three plasma samples were obtained to monitor serum gentamicin concentrations as follows: just before a dose; one hour after that same dose; and eight hours after that dose (two troughs and one peak level). The serum tobramycin concentrations at these times were 4 mg/L, 8 mg/L, and 5 mg/L, respectively. Calculate the volume of distribution, elimination rate constant, and clearance of tobramycin for L.F. Also, using the pharmacokinetic parameters calculated for L.F. above, develop a dosing regimen that will produce reasonable peak (10 mg/L) and trough (1 mg/L) concentrations of tobramycin.
3. A patient was given 80 mg gentamicin over 30 minutes (i.v.) from 9:30 to 10:00 am. The following two serum levels were measured: 6.5 $\mu\text{g/ml}$ at 10:30 am and 1.2 $\mu\text{g/ml}$ at 5:00 pm. Calculate:
 - a. the elimination rate constant k
 - b. the elimination half-life
 - c. the peak concentration at 10:00 am
 - d. the trough concentration at 5:30 pm
 - e. the volume of distribution
 - f. the clearance
4. A patient is admitted with an acute theophylline overdose. A serum level is measured at 45 $\mu\text{g/ml}$. Assuming an 8 hour half-life and no further drug absorption, how long does it take for the serum level to drop to the upper limit of the therapeutic range (20 $\mu\text{g/ml}$)?