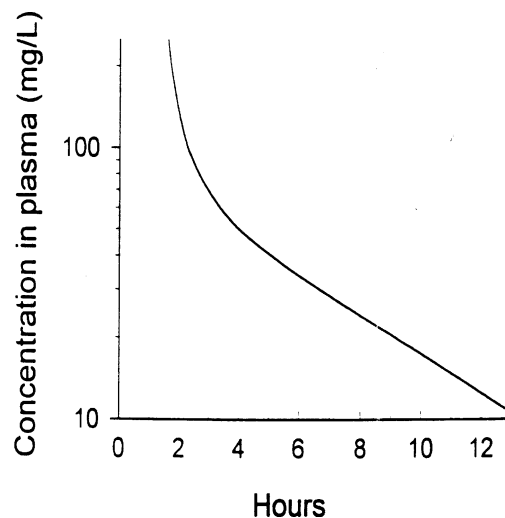


PHARMACOKINETICS PRACTICE PROBLEMS
DENTAL PHARMACOLOGY PL331

- 1) If equal volumes of intestinal juice (pH = 5.4) and plasma (pH = 7.4) were separated by an epithelial membrane, what would be the ratio of concentrations (plasma/intestinal juice) achieved by an organic acid (pKa = 6.4)? An organic base (pKa = 6.4)?
- 2) A 400 mg dose of a drug was given to a 60 kg woman. Extrapolation of the linear portion of the drug disposition curve intersects the Y-axis at 30 mg/L. What is the fractional volume of distribution?
- 3) The figure shows disposition of a drug after an intravenous dose of 1500 mg. Calculate the following: Volume of distribution (V_d); elimination constant (K_e); half-life ($T_{1/2}$); clearance (Cl).



- 4) If a drug has an elimination rate constant (K_e) of 0.3 days^{-1} , how much time is required for elimination of 95% of the drug?
- 5) A drug has a half-life of 3.5 hours, and a fractional V_d of 0.6 L/kg. If the drug is administered by IV infusion to a 65 kg man at a constant rate of 2 mg/min, what will be the steady-state plasma concentration? How long will it take to reach 95% of that concentration?
- 6) A drug was present in the plasma of a patient at a concentration of 400 $\mu\text{g/ml}$. 7 hours later, the concentration was 50 $\mu\text{g/ml}$. Assuming that the drug is eliminated by zero order kinetics, how long did it take to reduce the original concentration by 50%? Assuming that the drug is eliminated by first order kinetics, how long did it take to reduce the original concentration by 50%?

7) Drugs A and B are alike in that they are not metabolized, not bound to plasma proteins, and not secreted or reabsorbed by the renal tubule. Their volumes of distribution in a 50 kg woman are 10L and 30L, respectively. If the elimination half-life for A is 60 minutes, what is the elimination half-life for B? (Hint: What can you assume about the clearance of A and B?)

8) A drug is administered as an IV bolus dose of 200 mg to an 80 kg patient. The fractional volume of distribution is 0.1 L/kg. What is the theoretical concentration of drug in plasma at time = 0? After 4 hours, the concentration of the drug is 15 mg/L. What is the total amount of drug in the patient's body at 4 hours?

9) 100 mg of drug is given orally every 6 hours to a 70 kg patient. The bioavailable fraction after oral dosing is 50%. The drug is eliminated by first-order kinetics, with a half-life of 6 hours. The fractional volume of distribution is 0.7 L/kg. How long will it take to achieve a plasma concentration that is 95% of the steady-state concentration?

10) See question 9, above. If you wished to achieve that steady-state plasma concentration immediately by IV bolus injection, what loading dose would you give? If you wished to maintain that steady-state concentration indefinitely by oral administration, what dosage regimen would you prescribe?