جامعة بيرزيت
BIRZEIT UNIVERSITY

Homework 7

Bio pharmaceutics & Pharmacokinetics/PHAR434

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7. Park and associates (1983) studied the pharmacokinetics of amrinone after a single IV bolus injection (75 mg) in 14 healthy adult male volunteers. The pharmacokinetics of this drug followed a two-compartment open model and fit the following equation:

$$C_p = Ae^{-\alpha t} + Be^{-\beta t}$$

where

$A = 4.62 \pm 12.0\ \mu g/mL$

$B = 0.64 \pm 0.17\ \mu g/mL$

$\alpha = 8.94 \pm 13\ h^{-1}$

$\beta = 0.19 \pm 0.06\ h^{-1}$

From these data, calculate:

a. The volume of the central compartment

b. The volume of the tissue compartment

c. The transfer constants k_{12} and k_{21}

d. The elimination rate constant from the central compartment

e. The elimination half-life of amrinone after the drug has equilibrated with the tissue compartment

Answers (H.W. 7)

Muhammad Musleh

- $C_p = Ae^{-\alpha t} + Be^{-\beta t}$

$$\boxed{C_p = 4.62e^{-8.94t} + 0.64e^{-0.19t}}$$

(a) $V_p = D_o / A+B$ $\quad$ $\boxed{1\,mg = 1000\,ng}$

$$= \frac{75\,mg * 1000\,(ng)}{4.62 + 0.64}$$

$$\boxed{V_p = 14258.5\,mL} = 14.26\,L$$

(b) $V_t = V_p K_{12} / K_{21}$ $\quad$ (Need to get the Value of $K_{12} + K_{21}$ ©)

$$= \frac{14258.5 * 6.5215}{1.255}$$

$$\boxed{V_t = 74093.1\,ml} = 74.09\,L$$

© $K_{12} = \dfrac{AB(b-a)^2}{(A+B)(Ab+Ba)}$

$$= \frac{(4.62 * 0.64)(0.14 - 8.94)^2}{(4.62 + 0.64)((4.62 * 0.19) + (0.64 * 8.94))}$$

$$= \frac{226.38}{34.712844}$$

$$\boxed{K_{12} = 6.5215\,h^{-1}}$$

$$k_{21} = \frac{Ab + B\alpha}{A + B}$$

(2)

$$= \frac{(4.62 * 0.19) + (0.64 * 8.94)}{(4.62 + 0.64)}$$

$$k_{21} = 1.255\ h^{-1}$$

(d) $$k = \frac{ab\,(A+B)}{Ab + Ba}$$

$$= \frac{8.94 * 0.19\ (4.62 + 0.64)}{(4.62 * 0.19) + (0.64 * 8.94)}$$

$$= \frac{8.934636}{6.5944}$$

$$k = 1.3538\ hr^{-1} = k_d$$

(e) $$t_{1/2b} = \frac{0.693}{b}$$

$$= \frac{0.693}{0.19}$$

$$t_{\frac{1}{2}b} = 3.65\ hr$$