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M PHARMACY IN CLINICAL PHARMACY AND PHARMACY PRACTICE FIRST YEAR SECOND SEMESTER EXAMINATION 2018

Subject: Clinical Pharmacokinetics

Full marks: 100 **Time 3 hours**

Answer any **FIVE** of the following questions.

Calculator is allowed.

1. Considering the usual symbols, determine minimum and maximum plasma concentrations of drug, after *iv* administration of "n" number of consecutive doses with a fixed dosing interval in a patient. Determine (C∞)min and using the value determine Css.

A patient is administered antibiotic (half-life, 5h) by *iv*infusion with a rate, 3mg/h. After 30h, plasma drug concentration is 2.5 mg/L. Calculate total clearance and volume of distribution of drug.

8+2+4+6 = 20

2. Determine multiple dosing accumulation factor from (Cn)min value. Give the significance of accumulation factor. What do you mean by loading dose? Give its significances. Deduce the equation to establish the relationship between the loading dose and maintenance dose.

A doctor wants to maintain 2 mg/L plasma concentration of a drug in a patient by administration of a loading dose and simultaneously *iv*infusion. The drug has elimination rate constant, 0.2/h, and Vd,20 L. Find the loading dose and rate of infusion.

5+2+2+2+4+5 = 20

3. What do you mean by two compartment open model? Write the various assumptions of this model. Draw a two-compartment open model system where drug is administered in the central compartment and eliminates from it only. Develop its equations using Laplace transforms and determine drug concentration in the central compartment.

If Laplace form is As+B/ (s+a)(s+b), consider its anti-Laplace value:

$Xc = X_0(a-k_{21})e^{-at}/(a-b) + X_0(k_{21}-b)e^{-bt}/(a-b)$

A drug has Vd, 20L, K, 0.2/h, and Css, 18 mg/mL. Determine the rate of infusion to maintain the plasma level and time taken to achieve 90% of Css.

2+4+4+5+5 = 20

4. Using two compartmental model, deduce the equations and establish plasma concentration by oral route is in variably low than its *iv* administration, due to hepatic first pass effect.

If Laplace form is $(s+A)X_0/ (s+a)(s+b)$, consider its anti-Laplace value:

$Xc = X_0(k_{20}+k_{21}-a)e^{-at}/(b-a) + X_0(k_{20}+k_{21}-b)e^{-bt}/(a-b)$

If Laplace form is A/ (s+a)(s+b), consider its anti-Laplace value:

$Xc = X_0k_{21}e^{-at}/(b-a) + X_0k_{21}e^{-bt}/(a-b)$

20

5. (a) Establish time-concentration relationship for a more than one capacity limited process.

(b) Deduce the equation for metabolic level of drug in blood.

(c) Elimination of a half-life of a drug is 6h and volume of distribution is 25 L. Find the clearance.

10+8+2 = 20

6. Write short notes on:

(a) Residual method to determine Ka 10

Or

Wagner Nelson method to determine Ka 10

(b) Obesity and dose determination 5

Or

Dosing for elderly patient 5

(c) Dose determination for patient with renal insufficiency 5

Or

Flip-flop phenomenon 5