

PHA5128 – Dose Optimization II
Homework 1
Spring 2013

Drug A is given to patients via multiple intravenous infusions. Determine the dosing regimen (dosing rate and dosing interval) for Drug A to achieve a steady state plasma true peak concentration of 20 mg/L and true trough of approximately 4 mg/L. Assume that the drug follows a one-compartment first-order elimination ($CL=6$ L/h, $V_d=40$ L). (1 point)

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A new calcium channel blocker is eliminated entirely by hepatic metabolism. Consider administering the drug via constant infusion under the following conditions for normal individuals:

$$CL_{int} = 6.8 \frac{L}{min}, Q_h = 1.2 \frac{L}{min}, R_0 = 1 \frac{mg}{min}$$

Compute the steady state concentration of this drug. If the patient developed congestive heart failure resulting in a 20% reduction in Q_h , what would be the steady state concentration? (2 points)

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True or False: (1 point)

- 1 Inulin is the gold standard marker for measuring glomerular filtration rate.
- 2 The free drug concentration is associated with the pharmacodynamics effect of antibiotics.
- 3 For low extraction drugs that are 99% protein bound, a displacement by a competitor by 1% to 98% protein binding will result in a two-fold increase in the steady-state total drug concentration (total of bound plus free drug).
- 4 For high-extraction antibiotics that are 99.9% protein bound, displacement by a competitor by 0.1% to 99.8% protein bound will often result in an increase in their pharmacological effects.

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A patient was unconscious due to drug overdose. You determined that the primary drug in the patient's blood was a restricted drug whose pharmacokinetic parameters are $V_d = 50$ L, $CL = 10$ L/h. This restricted drug follows a one-compartment body model with linear pharmacokinetics. The patient's friend informed you that the patient injected himself approximately 3 hour prior to admitting to the hospital at 9:00 pm. The blood sample you took at 9:30 pm had 15 mg/L of this restricted drug. Compute the dose and clinical peak of the restricted drug. (1 point)