

PHA5128 – Dose Optimization II
Homework 3
Spring 2012

A male patient, 80 kg, 6' tall, was admitted to the hospital for seizure. The doctor administered a loading dose of sodium phenytoin to achieve a concentration level of 15 mg/L and prescribed a maintenance dose of 300 mg to the patient daily. After a week, the patient's steady-state concentration was 9 mg/L. The physician decided to increase his maintenance dose to 350 mg daily. After another week, the concentration of phenytoin at steady-state was 22 mg/L, which obviously is too high. The following dose was discontinued until the concentration dropped to 15 mg/L. Compute the time that it will take for the concentration to drop from 22 mg/L to 15 mg/L. (2 points)

PHA5128 – Dose Optimization II
Homework 3
Spring 2012

A 45 year old female patient with a history of seizure was only able to partially manage her condition with 300 mg/day sodium phenytoin. Her plasma phenytoin level was measured twice over the past year and both times were reported to be 9 mg/L. Her K_m value was 6 mg/L. Compute a dose which will achieve a steady state concentration of 15 mg/L. (1 point)

PHA5128 – Dose Optimization II
Homework 3
Spring 2012

A 70-year old male patient, 75 kg, has glomerular nephritis. His creatinine clearance is reasonably good while his serum albumin concentration is 2.9 g/dL. This patient receives 350 mg/day phenytoin and achieves a steady-state concentration of 7 mg/L. (1) Assuming that his K_m value is 7 mg/L, compute a dose that will allow him to achieve a steady state concentration of 12 mg/L. (2) Compute his phenytoin level if his serum albumin concentration were normal, which is 4.4 g/dL. (2 points)

PHA5128 – Dose Optimization II
Homework 3
Spring 2012

A female patient, 35 years of age, 56 kg, is started on phenobarbital sodium. (A) Compute a loading dose to yield a $C_p(t=0)$ of 25 mg/L. (B) Compute a daily maintenance dose to produce an average steady state concentration of 25 mg/L. (C) If the same patient were to be co-medicated with carbamazepine, propose an oral maintenance dose for carbamazepine for this patient to achieve a level of 6.8 mg/L. (3 points)

PHA5128 – Dose Optimization II
Homework 3
Spring 2012

A 50 year old male patient, 85 kg, received 250 mg/day of phenobarbital (given as BID; salt factor = 1) for the past 30 days. Compute the plasma concentration of phenobarbital just before the morning dose on day 31, assuming that the following pharmacokinetic parameters: $V_d = 0.7$ L/kg, $CL = 0.004$ L/h/kg for adults. (2 points)