

PHA 5128
Spring 2005
Case Study 5

1. Doug Durango is 40 year old male executive with uncontrolled hyperthyroidism with PAT. He has no history of previous illnesses and is not currently receiving any medications. He is 6' and weighs 200 lbs. Lab: serum potassium = 4.8 mEq/L, serum creatinine = 0.8 mg/dl. Design a loading and maintenance dosage regimen for IV or PO digoxin as you are not sure what the physician will prescribe. Three days after the patient receives your recommended regimen IV, the physician requests a serum digoxin conc. It is reported by the lab to be 0.9 ng/ml (1 hour before the next dose). The physician asks 3 questions: 1. What should be the dose IV if I want the trough to be 1.4 ng/ml at steady-state? 2. What should be the dose if we later switch to PO and keep 1.4 as the target trough for Lanoxicaps or Lanoxin tabs? 3. He plans to have surgery next week to control his hyperthyroidism. Will there need to be a change in his digoxin dosage at that time? If so what should be the recommended dosage regimen and a follow-up TDM plan?

2. M.K. is a 23 year old 64 kg chronic asthmatic who is hospitalized with severe asthma. She is treated there with aerosol albuterol, but has a poor response. She is then given 400 mg of IV aminophylline over 30 minutes. Thirty minutes after the loading dose was administered (60 minutes from time zero) the theophylline concentration was 10 $\mu\text{g/ml}$. She has normal liver, kidney, and cardiac function and is afebrile. After the loading dose, M.K. was started on an IV aminophylline of 55mg/h and albuterol nebulization. Eight hours after the first serum level, a second level was 15 $\mu\text{g/ml}$.

Using M.K.'s actual volume of distribution, calculate her expected steady state theophylline concentration for this infusion rate.

3. What would be the expected average serum digoxin concentration in an 80 year old lady with an ideal body weight of 60 kg while receiving 0.25 mg Lanoxin tablets ($F=0.7$) QD over the past 2 months? Her digoxin half-life is 55 hours and CL_{Cr} is 118 ml/min.

4. Estimate a digoxin loading dose that will produce a plasma concentration of 1.5 $\mu\text{g/L}$ for a 75 kg patient R.J., being treated for congestive heart failure. Assume R.J. is a 50-year-old male with a serum creatinine of 1.0 mg/dL. Calculate a maintenance dose that will achieve an average plasma digoxin concentration of 1.5 $\mu\text{g/L}$. If the patient had had a serum creatinine of 5 mg/dL, would the estimated loading dose have been different?

5. A 20 kg 5 year old child has been taking Slo-Bid 200 mg Q12h at home. Upon arrival in the emergency department, the resident draws a blood sample for a theophylline level and starts IV aminophylline at a rate of 1 mg/kg/h without a loading dose. The serum concentration comes back 3 hours later as zero but the patient is doing well so they don't give a loading dose. Twenty-four hours after admission, a serum theophylline concentration is 10 $\mu\text{g/ml}$.

a) Calculate this patient's theophylline clearance.

b) Is this patient's rate of theophylline metabolism faster, slower, or the same as an average 5 year old?