

Doses Workshop Loading Dose and Maintenance Dose

Find the answers to the following questions:

- I. Patient A is a 45 year old, 60 kg woman with a serum creatinine of 0.1 mmol/L. The target concentration of digoxin for the treatment of atrial fibrillation is 1 ng/mL. Tablets of digoxin contain 62.5 micrograms and 250 micrograms (mcg).
- A. What loading dose is required?
B. What maintenance dose is required?

Creatinine Clearance Prediction

$$CL_{cr}(L/h) = \frac{160 - \text{Age}(yr)}{250 \bullet S_{cr}(mmol/L)} \bullet \frac{Wt(kg)}{70} \bullet 0.9 \text{ if } F$$

For example: 60 year old, 140 Kg male with S_{cr} 0.1 mmol/L

$$CL_{cr}(L/h) = \frac{160 - 60yr}{250 \bullet 0.1mmol/L} \bullet \frac{140kg}{70} = 8L/h$$

- II. Patient B is a 5 year old, 20 kg girl with a serum creatinine of 0.1 mmol/L. The target concentration for theophylline for the treatment of bronchoconstriction is 10 mg/L. Tablets of theophylline contain 250 mg. An elixir contains 80 mg/15 mL.

Hint: Adult age and renal function do not influence V or CL for theophylline

- A. What is the predicted volume of distribution?
B. What is the predicted clearance?
C. What loading dose is required?
D. What maintenance dose is required?

Typical Pharmacokinetic Parameters for a 70 kg Patient

	Theophylline	Digoxin
F (oral)	1	0.65
V Liters	35	490
CLr L/h	0	CLcr
CLh L/h	2.8	3

- III. Patient A is a 45 year old, 60 kg woman with a serum creatinine of 0.1 mmol/L. The target concentration of cimetidine for the treatment of peptic ulceration is 1 mg/L.
- What IV loading dose is required?
 - What IV infusion rate is required?
 - What concentration would be reached 12 hours after starting an infusion? (no loading dose)

Typical Pharmacokinetic Parameters for a 70 Kg Patient

	Cimetidine
F (oral)	0.6
V Liters	150
CLr L/h	7 x CLcr
CLh L/h	10

Additional Problems:

Answer the questions above for the following patients:

Patient C: A 65 year old 70 kg man with a serum creatinine of 1 mmol/L.

Patient D: An 85 year old 60 kg woman with a serum creatinine of 0.1 mmol/L