

PHA 5128

Homework 4

1. Which combination of the following pharmacokinetic changes is the best one to describe the elderly and neonates? (These groups share similar PK characteristics.) (1 point)

- 1). Low renal clearance
- 2). Relatively less body water
- 3). Low metabolic clearance
- 4). Decreased protein binding
- 5). Longer half-lives

A) 1 & 4

B) 1, 3, & 4

C) 1, 3, 4 & 5

D) 1, 4, & 5

E) all of the above

2. 50 year old, 70 kg male has been receiving 200mg/day (100 mg BID) of phenobarbital ( $S=1$ ) for the past 25 days. Please calculate the phenobarbital plasma concentration just before the morning dose on Day 26. (2 points)

3. 42 year old, 62.5 kg female will receive carbamazepine regimen, please calculate a daily oral dose to achieve average steady plasma concentration of 7mg/L for monotherapy (Please use the key parameters available in the slides). (1 point)

4. H.T., a 52 year-old, 68 kg male, had been taking 300 mg/day of sodium phenytoin. However, his seizure was poorly controlled and his plasma concentration of the drug was only 7 mg/L. So his dose was increased to 400 mg/day. Then he began to complain about minor CNS side effects and his reported phenytoin plasma concentration is 22 mg/L. His renal and hepatic function is normal. It is assumed that both of the reported plasma concentrations represent steady-state levels and that H.T. has complied with the prescribed dosing regimens.

Calculate H.T.'s apparent  $V_m$  and  $K_m$  and a new daily dose of phenytoin that will result in a steady-state level of about 15 mg/L. (3 points)

5. N.J., a 48 year old 70 kg intermittent asthmatic patient, presents to the emergency room with severe dyspnea, coughing, and wheezing. He was treated there with aerosol albuterol, but was only partially relieved. He was then given 400 mg of IV aminophylline (dihydrate salt form) over 30 minutes. Thirty minutes after the loading dose was administered (1 hr from time zero) his theophylline concentration was  $15\mu\text{g/ml}$ . After the loading dose, he was started with an aminophylline IV constant infusion of  $55\text{ mg/hr}$ . His serum theophylline level was measured as  $9\mu\text{g/ml}$  after eight hours from the first measured serum level (9 hr from time zero). He smokes 1 pack of cigarettes a day and has normal liver, kidney, and heart function and is afebrile. ( $V_d = 0.5\text{L/kg}$ )

- 1). Calculate the total body clearance. (1 point)
- 2). Calculate the additional IV aminophylline loading dose necessary to increase his level from  $9\mu\text{g/ml}$  back to  $15\mu\text{g/ml}$ . (1 point)
- 3). Calculate N.J.'s expected steady state theophylline concentration for the infusion rate of  $100\text{mg/h}$  aminophylline. (1 point)