

PHAR 750 Quiz III - A

PHAR 750: Biopharmaceutics/Pharmacokinetics
November 6, 2007

Name: KEY A
Total 25 points

Circle your final answers.

Metronidazole ($S = 1.0$) follows a two-compartment pharmacokinetic model. After administering a single intravenous dose (1 g) in a female patient, the equation best describing metronidazole kinetics was:

$$C_p = 95 \mu\text{g/mL} e^{-\frac{2.72}{\text{hr}} t} + 4.9 \mu\text{g/mL} e^{-\frac{0.257}{\text{hr}} t}$$

$$C_p^0 = A + B = 99.9 \frac{\mu\text{g}}{\text{mL}} = 99.9 \frac{\text{mg}}{\text{L}}$$

1. Calculate the elimination half-life for the drug above? (3 points).

$$t_{1/2\beta} = \frac{0.693}{\beta} = \frac{0.693}{0.257} = \boxed{2.70 \text{ hr}}$$

2. Calculate the area under the curve? (3 points).

$$\text{AUC} = \frac{A}{\alpha} + \frac{B}{\beta} = \frac{95 \mu\text{g/mL}}{2.72/\text{hr}} + \frac{4.9 \mu\text{g/mL}}{0.257/\text{hr}}$$

$$= \boxed{53.99 \frac{\mu\text{g} \cdot \text{hr}}{\text{mL}}} \text{ or } \boxed{53.99 \frac{\text{mg} \cdot \text{hr}}{\text{L}}}$$

3. Calculate the V_p ? (3 points).

$$V_p = \frac{F \cdot D \cdot S}{A + B} = \frac{1000 \text{ mg}}{99.9 \text{ mg/L}} = \boxed{10.01 \text{ L}}$$

4. Calculate the C_p at 15 minutes? (4 points). $(15 \text{ min}) \left(\frac{1 \text{ hr}}{60 \text{ min}} \right) = 0.25 \text{ hr}$

$$C_p = \frac{95 \mu\text{g}}{\text{mL}} e^{-\left(\frac{2.72}{\text{hr}}\right)(0.25 \text{ hr})} + \frac{4.9 \mu\text{g}}{\text{mL}} e^{-\frac{0.257}{\text{hr}}(0.25 \text{ hr})}$$

$$= 48.13 \frac{\mu\text{g}}{\text{mL}} + 4.595 \mu\text{g/mL} = \boxed{52.73 \frac{\mu\text{g}}{\text{mL}}}$$

$$\text{or } \boxed{52.73 \text{ mg/L}}$$

Use the following information to answer the remaining questions.

Three people have had their serum creatinine measured. AJ, a male, has a serum creatinine of 1.0 mg%, is 5 feet 9 inches tall and is 38 years old. DR, a female, has a serum creatinine of 0.9 mg%, is 5 feet 4 inches tall and is 47 years old. Finally, MT is a 71 year old male, 6 feet 7 inches tall and has a serum creatinine of 1.0 mg%.

5. Rank in order which individual has the highest creatinine clearance to the individual with the lowest creatinine clearance (4 points)

- a. MT>DR>AJ
b. AJ>DR>MT
c. AJ>MT>DR
d. DR>MT>AJ
e. DR>AJ>MT

$$C_{Cr} = \frac{(140 - \text{age})(1.73)}{S_{Cr}} \left[0.85 \right]$$

AJ = 100.2 ml/min	$= \frac{(102)(70.7)}{1.0 \times 72}$
DR = 66.3 ml/min	$= \frac{(93)(54.7)}{0.9 \times 72} (0.85)$
MT = 89.8 ml/min	$= \frac{(69)(93.7)}{1.0 \times 72}$

6. What is the IBW of DR? (4 points)

- a. 93.7 kg
b. 54.7 kg
c. 70.7 kg
d. 59.2 kg
e. None of the above

$$\text{DR} \quad IBW = 45.5 + 2.3(4) = 54.7 \text{ kg}$$

$$\text{AJ} \quad IBW = 50 + 2.3(9) = 70.7 \text{ kg}$$

7. What is the IBW of MT? (4 points)

- a. 59.2 kg
b. 93.7 kg
c. 54.7 kg
d. 70.7 kg
e. None of the above

$$\text{MT} \quad IBW = 50 + 2.3(19) = 93.7 \text{ kg}$$