BIRZEIT UNIVERSITY

Homework 3

Bio pharmaceutics & Pharmacokinetics/PHAR434

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An antibiotic is to be given to an adult male patient (58 years, 75 kg) by IV infusion. The elimination half-life is 8 hours and the apparent volume of distribution is 1.5 L/kg. The drug is supplied in 60-mL ampules at a drug concentration of 15 mg/mL. The desired steady-state drug concentration is 20 *mc*g/mL.

a. What infusion rate in mg/h would you recommend for this patient?

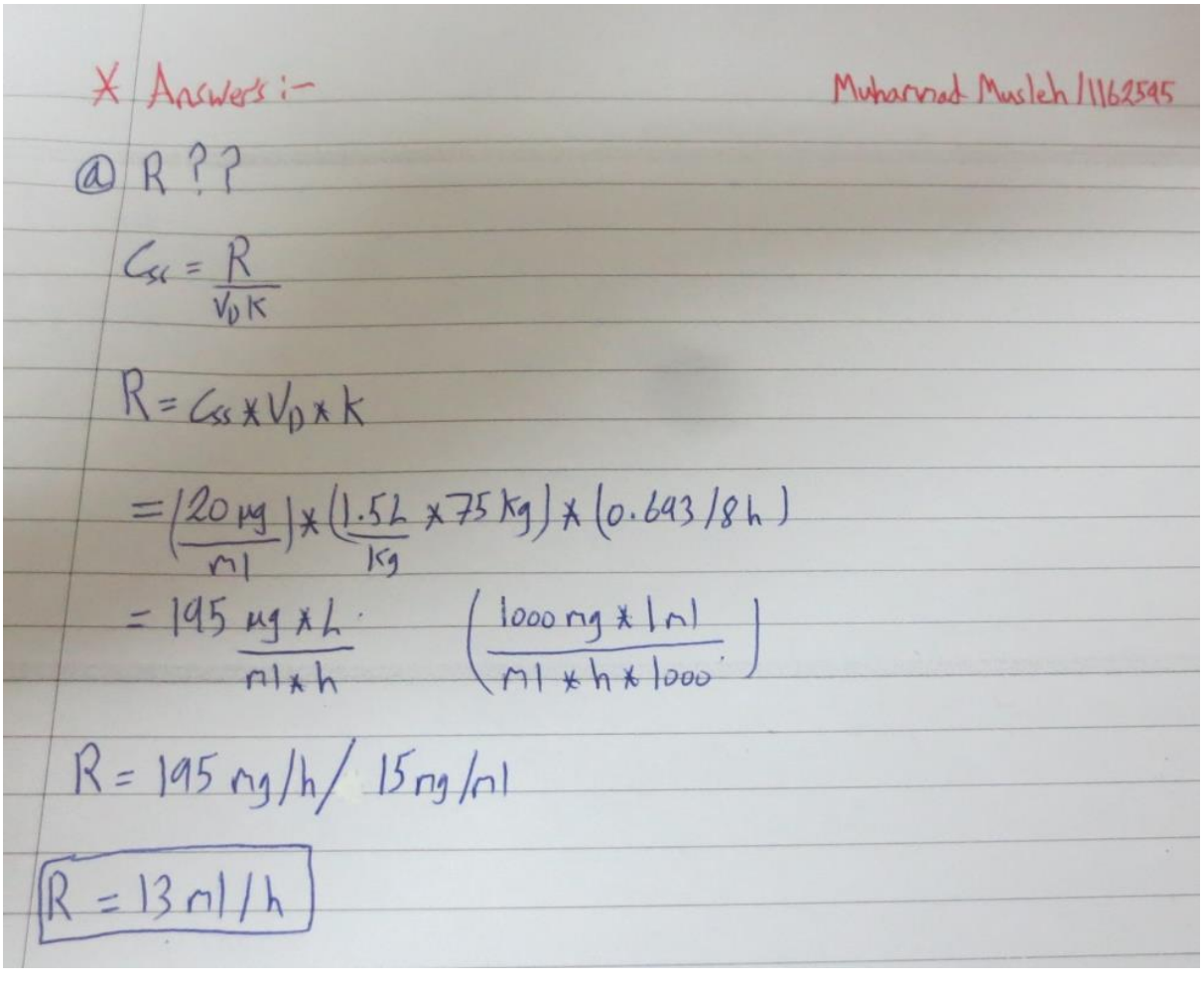
b. What loading dose would you recommend for this patient? By what route of administration would you give the loading dose? When?

c. Why should a loading dose be recommended?

d. According to the manufacturer, the recommended starting infusion rate is 15 mL/h. Do you agree with this recommended infusion rate for your patient? Give a reason for your answer.

e. If you were to monitor the patient's serum drug concentration, when would you request a blood sample? Give a reason for your answer.

f. The observed serum drug concentration is higher than anticipated. Give two possible reasons based on sound pharmacokinetic principles that would account for this observation.



(b) $C_{ss} = \frac{D_L}{V_D}$

$D_L = 20 * 1.5 * 75$

$\boxed{D_L = 2250 \text{ mg}}$ by I.V bolus injection. (loading dose)

(c) To get steady state [drug] as fast as possible.
concentration

(d) If R = 15 ml/hr, and Ampules contain 15 mg/ml drug, then 15 ml of antibiotic contain 225 mg of drug (15*15), so 15 ml/hr = 225 mg/h, so $C_{ss} = \frac{R}{k V_D} \Rightarrow \frac{225}{0.0866 * 112.5}$

$\boxed{C_{ss} = 23.1 \text{ mg/L}}$ this is theoretical and is close to the desired $C_{ss} = 20 \text{ mg/L}$.

(e) We take blood sample (Monitored) after 30-60 minutes of loading dose; because we give loading dose to decrease the time for administration.

(f) Maybe the following:-

1- Time sampling.
2- Drug-drug interaction.
3 Error in dosage regimen.
4- Decreased renal/hepatic function, slow elimination.