

Case Study 3 PHA 5127

Assume GFR is 130 mL min^{-1} and urine flow is 1.5 mL min^{-1} . For the following situations, indicate whether the drug is:

- only filtered
- filtered and reabsorbed through passive diffusion
- filtered and actively secreted

- 1a) A drug with $f_u = 0.04$ and a $Cl_{REN} = 40 \text{ mL min}^{-1}$
b) A drug with $f_u = 0.20$ and a $Cl_{REN} = 26 \text{ mL min}^{-1}$
c) A drug with $f_u = 0.30$ and a $Cl_{REN} = 30 \text{ mL min}^{-1}$

2.) A drug is eliminated through glomerular filtration (no other clearance mechanism is observed). The drug is 50% bound to plasma proteins. Glomerular filtration rate is normal (130 mL/min). No active renal secretion and passive or active reabsorption after renal filtration is observed. The volume of distribution is 50L.

What is the clearance of the drug? What is the elimination rate constant of the drug?

3.) Complete the following statements for a low molecular weight drug which does not bind to plasma proteins.

A. The maximum value which renal clearance can approach that of

B. If this drug is hydrophilic and not interacting with transporters the largest possible renal clearance is that of

C. If this drug is lipophilic, neutral drug and not interacting with transporters the smallest possible renal clearance is that of

D. Assuming that the lipophilic drug is a base, renal clearance can be reduced by

4.) An investigational new drug is eliminated entirely by liver (hepatic) metabolism, with a clearance of 1.40 L/min in subjects with an average liver blood flow of 1.50 L/min. What would be its expected clearance in a congestive heart failure patient with a liver blood flow of 1.10 L/min but no change in hepatic enzyme activity?

5.) J.P is a 40 y.o. man, height 5'6" with a serum creatinine level of 1.3 mg/dL. S.G is a 20 y.o. female, height 5'2", weight with a serum creatinine level of 1.5 mg/dL. Determine the creatinine clearance for each person. What can be deduced about the GFR for each of these people?