**Renal Clearance Practice 2**

**Pharmacokinetics**

**Q1. Kinetocid is an acidic, hydrophilic drug eliminated by the liver. The hepatic intrinsic clearance of free drug (Cl'int), steady-state volume of distribution (Vss), and free fraction in blood (fub) are listed here for a 70-kg subject:**

|  |  |  |
| --- | --- | --- |
| **Cl'int, mL/min** | **Vss, L** | **fub** |
| **187000** | **6.86** | **0.059** |

**I. The recommended iv dose of the drug is 290 mg adminsitered every 4 hr. Please estimate the following kinetic parameters:**

1. The apparent volume of distribution that is related to distribution of drug in the extravascular space (Vt,app) (Assume a blood volume of 0.07 L/kg) **7.24**

2. The clearance (Cl in mL/min) (Assume a liver blood flow of 1500 mL/min) **11063**

3. The plasma half life (t1/2 in hr) **2.4**

4. The total average steady state concentration (Css,total in mg/L) **0.52**

5. The free average steady state concentration (Css,free in mg/L) **0.031**

6. This drug may be characterized as:

1. Small V, low Cl   
2. Small V, high Cl   
3. Large V, low Cl   
**4. Large V, high Cl**

7. The free fraction of this drug in blood is expected to:

1. Increase in cirrhosis   
2. Decrease in burns   
**3. Both 1 and 2**   
4. None of the above

**II. In a disease state, the fub of the drug is decreased by a factor of 2 to a new value of 0.0295. Please determine the following in the presence of the disease state:**

1. Vss (in L) **6000**

2. Cl (in mL/min) **3634.5**

3. The plasma half life (t1/2 in hr) **60**

4. The total average steady state concentration (Css,total in mg/L) **0.018**

5. Do think that we need to adjust the dose in this case? Why?

Yes, it is necessary to adjust the dose in this case. Reason: Decreased f\_ab: In the case of the illness, f\_ab for the drug is reduced by a factor of 2. This means that there is less drug available in its free form in the blood. As a result, the drug concentration in the blood will be lower than required to achieve the desired therapeutic effect. Long half-life: In the case of the illness, the drug has a long half-life (60 hours). This means that it takes longer to eliminate the drug from the body. As a result, it can accumulate

**Q2. Kinetamine is a basic, lipophilic drug eliminated by the liver. The hepatic intrinsic clearance of free drug (Cl'int), steady-state volume of distribution (Vss), and free fraction in blood (fub) are listed here for a 70-kg subject:**

**Cl'int = 123000 Vss, L = 177 fub =0.4**

**I. The recommended iv dose of the drug is 260 mg adminsitered every 4 hr. Please estimate the following kinetic parameters:**

1. The apparent volume of distribution that is related to distribution of drug in the extravascular space (Vt,app) (Assume a blood volume of 0.07 L/kg **185.2**

2. The clearance (Cl in mL/min) (Assume a liver blood flow of 1500 mL/min) **49200**

3. The plasma half life (t1/2 in hr) **0.023**

4. The total average steady state concentration (Css,total in mg/L) **0.002**

5. The free average steady state concentration (Css,free in mg/L) **0.0008**