بسم الله الرحمن الرحيم

حركية 2

Al-Azhar University-Faculty of Pharmacy
Department of Pharmaceutics and Industrial pharmacy

Final Exam
Biopharmaceutics and Pharmacokinetics (2)

اسم الطالب:

Section	Marks
Section 1	/20
Section 2	/20
Section 3	/20
Medterm	/40
Final marks	/100

Section 1

Put true or false please:

(من فضلك انقل الاجابة النهائية الى الجدول الموضح ادناه)

1. Any factor that increases the biological half-life of the drugs will also increases the volume of distribution and decreases the constant rate of elimination.
2. The marked Sodium Chloride is used experimentally as indicator to determine the volume of distribution in the intracellular space.
3. According to the first ketty theory the amount of the tissue drug accumulation is directly proportional to the concentration of the drug in the vein.
4. The stimulants of the microsomal enzyme systems are called enzyme inducers that decreases the biological half-life's of the drugs, decreases the duration and increases the biotransformation of the drugs.
5. The bioavailability of the drugs increases, the total body clearance is increased and the first-pass effect is decreased in the result of enzyme deficiency.
6. The renal clearance should be calculated from the maximum amount excreted in the urine divided to the area under the curve from zero to infinity.
7. The peak plasma concentration after the extravascular administration of the drugs is related directly with the dose, constant rate of absorption and the constant rate of elimination and inversely proportional with the volume of distribution.
8. The drug accumulation is the increase of the drug concentration in the blood and tissue upon multiple dosing until the steady state is reached.
9. If the drug is partially reabsorbed then its clearance value will be more than 130 ml/min.
10. The tissular drug concentration according to the second kettys theory is related directly with the tissular volume and the concentration of the drug in the vein.

11. The non-linear pharmacokinetics is called dose-independent pharmacokinetics that implies that the concentrations are not directly proportional to the transfer rates.
12. The competetive inhibition between the substrate and the inhibitor for binding to enzymes increases the Km and the maximum velocity of the reaction does not change.
13. The residual method for the determination of the constant rate of absorption should be considered as ideal when the kinetics of release is zero order.
14. The sum of all body regions to which the drug is eventually distributed but in not instantaneous equilibrium is called central compartment.
15. The volume of blood in ml which is completely cleared of the drug per unit time (minute) by urinary excretion or metabolism is called renal clearance.

Question	Answer	Question	Answer
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		Good luck	

B. Define the following:

1. **Posology.**

2. **K12.**

3. **Feathering.**

4. **Biliary recycling .**

5. **Creatinine clearance.**

Section 2

1. The pharmacokinetic of the plasma drug concentration-time curve for a drug that is given by intravascular-bolus administration equation that fits the data obtained were:

$$Cp = 55.\ e^{-0.55*t}$$

The drug was given as iv-bolus of 5 mg/kg for ten patients (average weight 70 kg), please calculate the following:

A. What is the $t_{1/2}$?
B. What is the V_d?
C. What is the plasma level of the drug after 5 hours?
D. In percent how much drug is left in the body after 5 hours?
E. When the next dose must be administered if the drug wil not be effective pharmacologically when declines to 3 μg/ml.

2. The pharmacokinetic parameters for the drugs A and B are illustrated in the following table:

Pharmacokinetic Parameters	Drug (A)	Drug (B)
Ke	0.033 h^{-1}	0.050 h^{-1}
Protein binding	80 %	15 %
XU^{∞}	150 mg	280 mg
Cp (4h)	5.55 µg/ml	2.92 µg/ml
X_0	300 mg	300 mg
GFR	130 ml/min	130 ml/min

Indicate, which mechanism is predominant in the renal excretion for each medicament?

3. The following pharmacokinetic parameters are obtained after the oral administration of 400 mg of both drugs drug A and drug B:

Drug	$k_a(hr^{-1})$	$k_e(hr^{-1})$	V_d (mL)
A	1.5	0.3	5L
B	0.4	1.2	8L

The drugs A and B follow a one-compartmental open model and assume that the drug is completely bioavailable, calculate the following please:

- **Calculate the t_{max} for each drug.**
- **Calculate the C_{max} for each drug.**

Section 3

1. Give mathematically **in details**, how the concentration of the drugs in the incorporation phase should be calculated if the drug is administered by IV-Infusion.

2. Give graphically the two compartmental open-model and explain in details the hybridization (**Equations**).

3. Give the significance of the apparent volume of distribution?

4. Give and explain the types of bioavailability and how each type should be calculated and explain in details the trapezoidal rule?

Good luck
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