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Al-Azhar University-Faculty of Pharmacy
Department of Pharmaceutics and Industrial pharmacy
Biopharmaceutics and Pharmacokinetics 2
Final Exam

حركية ٢
د.عصام
فاينال ٢٠١٨

B

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اسم الطالب:

Section	Marks
SECTION ONE	/30
SECTION TWO	/15
SECTION THREE	/15
MEDTERM EXAM	/40
FINAL MARKS	/100

Section 1 (30 marks)

A. Put true or false please:

(من فضلك انقل الاجابة النهائية الى الجدول رقم 1 الموضح فى صفحة 5)

1. As the free drug concentration in the plasma increases, the glomerular filtration for the drugs increases proportionately, thus increasing the renal clearance for some drugs.

2. The K_{12} when the drug is administered by intravascular route of administration and the model is bi-compartmental is the hybrid first-order rate constant for the distribution process.

3. There is directly relationship between the constant rate of absorption and the plasma protein binding, as the Ka is increased, the plasma protein binding is also increased.

4. As a result of the non-competitive inhibition between the substrate and the inhibitor for binding to enzymes, the constant of Michalis-Menten Km is increased and the Vmax does not change.

5. The stimulants of the microsomal enzyme system decreases the biological half-life's of the drugs, decreases the duration of action and increases the biotransformation of the administered drugs.

6. As consequences of the deficiency of the metabolizers, the first-pass effect is decreased, the drug biotransformation is increased and the clearance is increased.

7. The gastrointestinal motility increases the bioavailability of the drugs because it increases the small intestine drugs absorption by decreasing the contact time in the stomach.

8. Basic drugs have small Vd (0.1-1.0 L/Kg due to high plasma protein binding, while acidic drugs has a large Vd (1-5.0 L/Kg).

9. The heavy water is used in the determination of water in the different spaces when the drug is lip-soluble with large volume of distribution and very slow biological half-life.

10. The time to reach the maximum concentration of drugs is decreased when the constant rate of absorption and the constant rate of elimination are increased.

11. Slower drugs distribution in the body, means that greater will be the number of compartments required to characterize the plasma concentration against time and more complex will be the equation employed.

12. The residual method used for the determination of the constant rate of absorption, when the drug is administered by extravascular route of administration and is mono-compartamental is ideal when the kinetics of liberation is zero order.

13. Increasing of diet with less protein and more carbohydrates increases the drugs biotransformation.

14. According to Second Ketty's theory the tissular accumulation of drugs is indirectly proportional with the vein drug concentration.

15. The creatinine clearance is the ratio of excretion of creatinine in urine to the concentration of creatinine in plasma and the creatinine clearance decreases with the age.

16. By increasing the membrane surface area, increasing the number and by increasing the membrane thickness, the filtration rate increases proportionately.

17. The maximum amount of drug excreted by urine should be calculated as the multiplication of renal clearance per area under the curve from zero to infinity.

18. The hypothetical volume of distribution in ml of the metabolized drug, which is cleared in one minute via the liver, is called hepatic clearance.

19. The nonlinear Pharmacokinetics is called dose-independent pharmacokinetics that implies that the drug concentrations are not directly proportional with the transfer rates.

20. Any factor that increases the biological half-life of drug will also increases the volume distribution and decreases the constant rate of elimination.

B. MCQ: Choose the best answer

(من فضلك انقل الاجابة النهائية الى الجدول رقم 2 الموضح فى صفحة 5)

1. **The term biotransformation includes the following:**

   A. Accumulation of substances in fat tissue.
   B. Binding of substances with plasma proteins.
   C. Accumulation of substances in a tissues.
   D. Process of physicochemical and biochemical alteration of a drug in the body.
   E. None of the above.

2. **The volume of distribution (Vd) relates:**

   A. Single to a daily dose of an administered drug.
   B. An administered dose to body weight.
   C. An unchanged drug reaching the systemic circulation.
   D. The amount of drug in the body to the concentration of the drug in plasma.

3. **What is the biological half-life of the drug:**

   A. Time interval, during the amount of drug is reduced to its half.
   B. Time interval, during only the half of the biological effect is achieved.
   C. Time interval, during half of the drug is metabolized.
   D. Time interval, during half of the drug liberates from protein binding.

4. **If the iv-administered dose is 300 mg and the Vd is 12000 ml, so the initial concentration is:**

   A. 25 µg/ml
   B. 25 mg/ml
   C: 0.25 L/h
   D. None of the above answers.

5. **The total body clearance is related with:**

   A. Only the concentration of drugs in plasma.
   B. Only the elimination rate constant.
   C. Volume of distribution, half-life and elimination rate constant.
   D. Bioavailability and half-life of drugs.
   E. All of the above answers.

6. **Which of the following is the lag time:**

A. The time needed for the drug to reach the lower therapeutic effect.
B. The time needed for the drug to reach the maximum effect after the administration of the drugs.
C. The time needed for the drug to be measurable in the blood.
D. The time needed for the pharmacological response take place.

7. **Biotransformation of drugs is to transform the drug to be:**

A. Less ionized.
B. More pharmacologically active.
C. More lipid soluble.
D. Less lipid soluble
E. Al answers are correct.

8. **The bi-exponential profile of plasma drug concentration versus time is depends of:**

A. Blood flow and the permeability of the drug to the tissues.
B. The constant rate of absorption of the drug.
C. The constant rate of elimination of the drug
D. All the above.
E. None of the above.

9. **Stimulation of microsomal enzyme systems can:**

A. Require the dose increase of some drugs.
B. Require the dose decrease of some drugs.
C. Prolong the duration of action of a drugs.
D. Intensify the unwanted reaction of a drugs.

10. **If the clearance of the drug is 130 ml/min means:**

A. The drug is partially reabsoped.
B. The drug is filtered only.
C. The drug is actively secreted.
D. None of the above answers.

الجدول رقم 1

Question	Answer	Question	Answer
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

الجدول رقم 2

Question	Answer
1	
2	
3	
4	
5	
6	
7	
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10	

Section 2 (15 marks)

1. 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?

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

Drug	$k_a(hr^{-1})$	$ke(hr^{-1})$	V_d (mL)
A	1.5	0.3	5000 ml
B	0.4	1.2	8000 ml

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

A. **Calculate the t_{max} for each drug.**

B. **Calculate the C_{max} for each drug.**

Section 3 (15 marks)

1. **Give graphically and schematically the two compartmental open-model after the intravascular administration of the drugs explain in details the hybridization (Equation/s).**

2. **Give the significance of the apparent volume of distribution?**

3. How the t_{max} should be calculated mathematically?

Good luck
Dr. Issam Abushammala