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2025

B.Pharm. 6th Semester End-Term Examination

BIOPHARMACEUTICS AND PHARMACOKINETICS

Full Marks – 75 Time – Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following. Multiple Choice Questions: 1×20

(i) A loading dose is used to:

(a) Reduce drug clearance

(b) Achieve the desired drug concentration quickly

(c) Minimize side effects

(d) Increase drug absorption

(ii) A multi-compartment model assumes that all transfer rate processes for the passage of drug into or out of the individual compartments follows

(a) Zero order (b) First order

(c) Pseudo order (d) All of these

(iii) Half life is the time required to

(a) Change the amount of a drug in plasma by half during elimination

(b) Bind a half of an introduced drug to plasma protein

(c) Metabolize a half of an introduced drug into the active metabolite

(d) Absorb half of an introduced drug

(iv) Which of the following reaction is not a phase I metabolic reaction?

(a) Flavin-containing monooxygenase

(b) Monoamine oxidases

(c) Glucuronyltransferase

(d) Esterases

(v) Which of the following drugs has a large volume of distribution (Vd)?

(a) Heparin (b) Warfarin

(c) Digoxin (d) Insulin

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(vi) Which types of drug get absorbed by ion-pair transpot?

(a) Affinity for carriers

(b) Highly lipophilic

(c) Oil droplets

(d) Drug which ionizes at all pH ranges

(vii) According to Fick's First Law of Diffusion, the rate of drug absorption across a membrane is directly proportional to:

(a) Thickness of the membrane

(b) Drug concentration on the absorbing side

(c) Drug concentration on the non-absorbing side

(d) Molecular weight of the drug

(viii) Which of the following equations describes the rate of drug dissolution according to Noyes Whitney equation?

(a) $dC/dt = (D \times A \times (Cs - C))/h$ (b) $dC/dt = K \times C\text{^}n$

(c) $dC/dt = V \times Km/(Km + C)$ (d) $dC/dt = (A \times C)/V$

(ix) The lipoprotein with the fastest electrophoretic mobility and the lowest TG content is

(a) VLDL (b) HDL

(c) LDL (d) Chylomicrons

(x) The pH-partition hypothesis explains drug absorption based on:

(a) Lipid solubility and ionization of the drug

(b) Gastric emptying rate

(c) Drug metabolism

(d) Drug solubility in plasma

(xi) Which of the following can lead to drug displacement from protein binding sites?

(a) Decreased renal clearance

(b) Presence of another highly protein-bound drug

(c) High lipid solubility

(d) Low plasma albumin levels

(xii) ———— is used to study gastric emptying time.

(a) Aluminium Sulphate

(b) Barium Sulphate

(c) Aluminium Hydroxide gel

(d) Calcium Sulphate

(xiii) According to pH-partition hypothesis, a weakly acidic drug will most likely be absorbed from the stomach because the drug which exist primarily in the

(a) Ionized and more water-soluble form

(b) Unionized and more lipid soluble form

(c) Form of weak acid and more soluble in stomach pH

(d) Ionic form of the drug which facilitates diffusion

(xiv) Most drugs are excreted by the kidneys, and some are excreted by the biliary system. Which of the following are NOT excreted by the kidneys or biliary system?

(a) Drugs with higher molecular weight

(b) Lipophilic drugs

(c) Volatile anesthetics

(d) Water-soluble drugs

(xv) The characteristic of non-linear pharmacokinetics include ————————.

(a) Area under the curve is proportional to the dose

(b) Elimination half-life remains constant

(c) Area under the curve is not proportional to the dose

(d) Amount of drug excreted through remains constant

(xvi) The drug concentration between Minimum Effective Concentration and Maximum Safe Concentration is called

(a) Therapeutic range (b) Area under curve

(c) Peak response (d) Pharmacological response

(xvii) The Initial distribution of drug into the tissue is determined chiefly by

(a) Rate of Blood Flow to Tissue (b) Plasma Protein Binding of Drug

(c) Affinity for Tissue (d) Gastric Emptying Time

(xviii) ———————— is the ratio of mean residence time to absorption time.

(a) Dissolution number (b) Absorption number

(c) Intrinsic dissolution (d) Dose number

(xix) *In-vitro* dissolution rate studies on drug product are useful in bioavailability evaluation of they are correlated with

(a) Disintegration rate

(b) Chemical stabilities of drugs

(c) *In-vivo* studies in human

(d) All of these

(xx) When the active transport system becomes saturated, the rate process becomes

(a) Zero order (b) First order

(c) Pseudo first order (d) Pseudo zero order

2. Answer any *seven* questions: 7×5

(a) Discuss in brief various physico-chemical factors affecting absorption of drugs through GIT.

(b) Define AUC. Explain the Trapezoidal method for the calculation of AUC.

(c) Explain renal clearance of the drugs. How do you determine renal clearance of drugs?

(d) Derive Michaelis - Menten equation in determining non-linearity.

(e) Explain the kinetics of protein binding.

(f) Discuss the various study designs for performing bioavailability.

(g) Discuss the concept of the apparent volume of distribution (Vd) and its significance.

(h) Explain in brief about the pH- partition hypothesis with example.

(i) Derive the equation for first order rate kinetics (Linear kinetics).

3. Answer any *two* questions: 2×10

(a) Define the term Pharmacokinetics. With the help of plasma drug concentration time profile curve explain in details about pharmacodynamic and pharmacokinetic parameters.

(b) Explain in details the mechanisms of drug absorption through the gastrointestinal tract (GIT).

(c) Discuss in detail one-compartment open model for a drug administered as IV Bolus. Give the schematic representation, graphs and equations for the same.