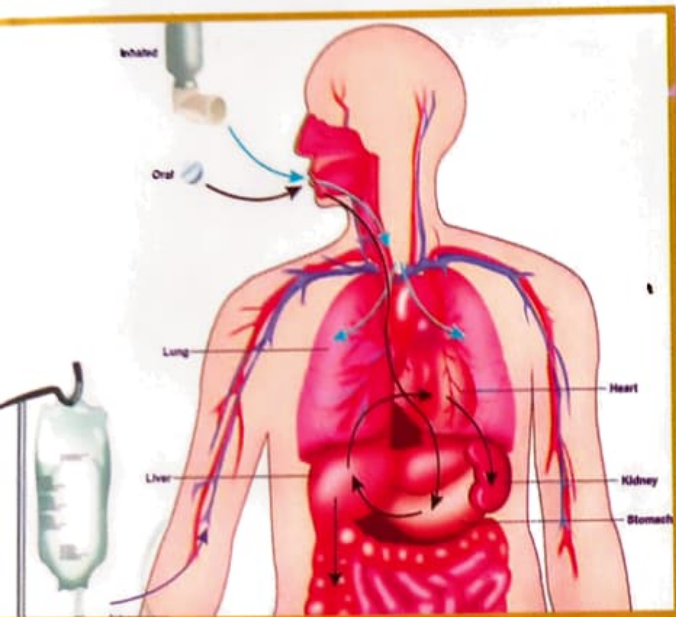


NEW AGE

BIOPHARMACEUTICS AND PHARMACOKINETICS

For B.Pharma Degree Sixth Semester Programmes of ALL INDIAN UNIVERSITIES
As Per the Latest Syllabus of Pharmacy Council of India (PCI)



AKHLESH K JAIN • KEERTI MISHRA



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BIOPHARMACEUTICS AND PHARMACOKINETICS

Biopharmaceutics and Pharmacokinetics is one of the key components in understanding the performance of the drugs and dosage form. In this comprehensive textbook, subject matter has been explained in a simple and student friendly language.

This book is application oriented textbook especially designed to meet the requirement of pharmacy students. It brings out the key concepts of Biopharmaceutics and Pharmacokinetics in a simple and lucid manner as per the syllabus prescribed by Pharmacy Council of India for B. Pharma students. The present book attempts to cover the entire range of the syllabus with most systematic order explaining each and every topic at desired length.



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Preface



As majority of students find Biopharmaceutics and Pharmacokinetics subject most difficult and unapproachable, we have tried to solve their problems by writing this book. We have presented each topic in very easy-going manner with more generous way. While writing this book, the key focus of authors is to present the basic concepts of biopharmaceutics and pharmacokinetics in-depth to the students to help them grasp and understand the subject in the easiest possible way. Over decades, the students of pharmacy have been searching for a concise handbook of experiments to fulfil their needs, thus this book is compiled as a single document providing entire required information.

The book deals with the principles of biopharmaceutics and pharmacokinetics including the action of drug in the body along with the basics of absorption, distribution, metabolism and excretion. The entire book is divided into five chapters, namely:

Chapter 1: Introduction to Biopharmaceutics

Chapter 2: Elimination, Bioavailability and Bioequivalence

Chapter 3: Pharmacokinetics

Chapter 4: Multicompartment Models

Chapter 5: Non-linear Pharmacokinetics

Each chapter in the book forms a unique chain of understanding with an attempt to make the topics interesting. Theoretical definitions, brief description/explanation, discussions and derivations are furnished, with informatory examples and diagrams for the clarification of concepts in every chapter. Few additive exercise problems are also enclosed at the end of every chapter to help the student in gaining skills in problem solving. In keeping the mind of every type of student, practice questions are given ranging from very easy to somewhat difficult in order to be solved fairly by each student. After completion of the book, the student would be able to:

1. Understand the basic concepts of biopharmaceutics and pharmacokinetics.
2. Derive the various models and estimate their pharmacokinetic parameters.
3. Design and evaluate dosage regimens of drugs, using pharmacokinetic and biopharmaceutics parameters.

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CHAPTER 1

Introduction to Biopharmaceutics

Biopharmaceutics is a leading branch in pharmaceutical sciences which relates between the physicochemical properties of a drug in dosage form and the pharmacology, toxicology, or clinical response observed after its administration. It is the study of factors affecting the rate and amount of drug that reaches the systemic circulation and the utilization of this information in optimizing the therapeutic efficacy of drug products. In easy words, *biopharmaceutics* is the study of the physical and chemical properties of a drug and its dosage form in which the drug is administered, and the route of administration on the rate and extent of systemic drug absorption. It is also characterized as the study of inter-relationship among the physicochemical properties of a drug in a dosage form and the biological response determine. Biopharmaceutics is a distinct discipline which accounts all the various factors influencing the therapeutic effectiveness of drug. Biopharmaceutics is an integral component of the overall drug development cycle.

A. ABSORPTION

Absorption is the process of movement of unchanged drug from its site of administration to the systemic circulation. It refers to the passage of drug molecules from the site of administration into the circulation. **Bioavailability** is the rate and extent of drug absorption. It is the extent to which an active moiety is absorbed from a pharmaceutical dosage form and becomes available in the systemic circulation. The movement of drug from one compartment to another is called **distribution**. Distribution provides information on the extent and time course of tissue accumulation and the elimination of drug and/or its metabolites. **Elimination** is the process that removes the drug from the body and stops its action. It takes place by two processes: **Biotransformation** (metabolism), which normally inactivates the drug, and **excretion**, which tends to exit the drug/metabolites from the body. Metabolism is the enzyme-catalyzed conversion of drugs to their metabolites. Metabolism makes the drug less polar; lipid-soluble substance makes it more polar as well as water soluble, thus facilitating their excretion by the kidney.

Apart from the mechanism of absorption, distribution, metabolism and excretion, it is also essential to understand the kinetics through which they happen