Pharmacokinetics and biopharmaceutics: Basic concepts

Learning Outcome Objectives
Upon successful completion of this lesson, you should be able to:
1. Define common pharmacokinetic terms and explain their application.
2. Discuss the major processes and factors involved in drug absorption, distribution, metabolism and excretion.
3. Define zero and first order, describe the processes they represent, and determine a zero- and a first-order rate constant.
4. State the concepts of bioavailability and bioequivalence, and calculate these two pharmacokinetic parameters.
5. Discuss the theoretical basis of a one- or two-compartment model for various routes of drug administration, and calculate common pharmacokinetic parameters.
6. Describe and use the principles of steady state.
7. Apply the relationship between volume of distribution, clearance and elimination half-life.
8. Outline the basic principles of hepatic drug clearance and the factors that can alter drug concentrations.
10. Outline the basic principles of non-linear kinetics and apply these to phenytoin dosing.
11. Summarize the complexities involved in the general application of pharmacokinetic principles to special populations.

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Dr. Riggs worked as both a community and hospital pharmacist prior to obtaining his M.Sc. and Ph.D. degrees. He joined the Faculty of Pharmaceutical Sciences at The University of British Columbia (UBC), Vancouver, BC, in 1989, and is currently a full professor, teaching pharmacokinetics at both the undergraduate and graduate levels. He has also served in a number of administrative roles, including Chair of the Division of Pharmaceutics and Biopharmaceutics, and interim Associate Dean of Graduate Studies.

His research interests include the detailed examination of the pharmacokinetics of placental drug transfer in both model systems and human subjects, and the investigation of the effects of single nucleotide polymorphisms in reductase genes on the efficacy/toxicity of various drugs used in the treatment of breast cancer and leukemia as well as on endogenous hormones in prostate cancer. He has published numerous peer-reviewed articles, has been an invited speaker at national and international conferences, and has trained one M.Sc. and 11 Ph.D. students.

Expert Reviewer: Fakhreddin Jamali, Pharm.D., M.Sc., Ph.D.
Dr. Jamali is a professor at the Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta. His research interests include the effect of pathophysiological changes on the action and disposition of drugs; stereochemical aspects of drug action and
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Dr. Jamali is a member of the Health Canada TPP Expert Advisory Committee on Bioavailability and Bioequivalence, and the Expert Advisory Panel on Nonsteroidal Anti-inflammatory Drugs. He is the founding president of the Canadian Society for Pharmaceutical Sciences and editor-in-chief of the Journal of Pharmacy & Pharmaceutical Sciences, and has served as associate editor or on the editorial board of several journals. He teaches pharmacokinetics and clinical pharmacology, and is involved in pharmacy curriculum development.