Department: Pharmaceutical Sciences

Course title: Applied Biopharmaceutics and Pharmacokinetics

Course N.o: 1101705

Office Hours: Sun, Tue, Thu: 9-10
Mon, Wed: 1-2

Zarqa University
Faculty of pharmacy

Prerequisite: None

Instructor: Dr. Rana Abutaima

Lecture's time: Wed 4:30-7:30

Semester: Ist 2020/2021

Course description:

This course will discuss briefly the various effects of physicochemical properties of active ingredients, pharmaceutical dosage forms, physiological factors and routes of administration on drug bioavailability. In order to evaluate the pharmacological activities and/or toxicities of a drug, the concept of Pharmacokinetics, including its linked models and other factors that might affect drug's kinetics (i.e. drug Absorption, Distribution, Metabolism, and Excretion) will be discussed. Handling kinetic data and using the mathematical calculations to solve problems that might pharmacist face in clinical set up. Emphasis will be placed upon the prediction of plasma levels of drugs under varying conditions applying different pharmacokinetic parameters and correlate this level plasma level with their pharmacological responses. In addition, this course is intending to study the performance of the drug in vivo by introducing and discussing how to design and analyze bioavailability and bioequivalence studies.

Aims of the course:

1. Understanding mathematics of the time course of Absorption, Distribution, Metabolism, and Excretion (ADME) of drugs in the body.
2. Understanding the differences among pharmacokinetic approaches for modeling concentration time data.
3. Understanding the theory behind bioequivalence.
4. Understanding In vivo In vitro correlation (IVIVC) concept

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding

A1. Concepts and Theories: Factors affecting ADME, understanding mathematical equations related to ADME, Bioavailability, Bioequivalence and IVIVC.

A2. Contemporary Trends, Problems and Research: Solving problems in pharmacokinetic arena (i.e. extrapolating experimental data to find the best fit compartmental model).

B. Subject specific skills

B1. Problem solving skills: Work effectively in a team, demonstrate both oral and written communication skills, apply advanced mathematics calculation in kinetics, present data on Cartesian and semi-log graph papers for kinetics parameters extraction. Be able to give a

seminar, to discuss problems with others, to communicate with his colleagues and analyze different subjects

B2. Application of Methods and Tools: Application of mathematics and compartmental models in designing bioequivalence study

C. Critical- Thinking Skills
C1. Analytical Skills: The student should be able to analyze and scientifically use equations which will help him understand the processes that the drug undergoes inside the system and the fate of this drug.

C2. Strategic Thinking: Relate the physiological basis of route/physico-chemical properties of drug products on drug bioavailability, realize the theory behind bioequivalence.

C3. Creative thinking and innovation: Design sampling protocols for pharmacokinetic, bioavailability and bioequivalence studies.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Communicating the results of pharmacokinetic analyses.

D2. Teamwork and Leadership: Fostering an ability to work together in teams, engaging in group work, and to develop skills motivating others to accomplish goals and solving problems.

Competencies:

Competencies	
1.1 (Learner)	**3.1(Solver)**
2.1 (Carer)	**4.3 (Innovator and entrepreneur)**
2.2 (Prescriber)	**4.4 (Professional)**
2.3 (leader)	

Teaching strategies in course outline:

Teaching strategies in course outline	
■ **Lectures**	□ **Field visits**
□ **Online Lectures**	□ **Role play**

☐ **Practical training / laboratory**	■ **Presentation**
☐**Seminar / Workshop**	☐ **Quizzes**
■**Moodle**	■ **Online resources**
■ **Case study**	■ **Team based learning**
☐ **Flipped classroom**	☐ **Social related activities (chat)**
☐ **Simulation**	■ **Other assignments and homework**
☐ **Others:**	

Course Contents and Schedule:

Week	Topics	Teaching Procedure	Specific ILOs in addition to earlier ILOs
W1-2	**Introduction to Biopharmaceutics & Pharmacokinetics**	Lecturing and discussion	A1, A2
W3-7	**Compartmental PK (one compartment model)**	Lecturing and discussion	A1, A2, B1, B2 C1, C2, C3, D1, D2
W8-9	**Bioavailability**	Power point presentations Discussion, chalkboard & case study	A1, A2, B1, B2 C1, C2, C3, D1, D2
W10-11	**Bioequivalence and statistical bioequivalence**	Power point presentations Discussion, chalkboard & case study	A1, A2, B1, B2 C1, C2, C3, D1, D2
W12-13	**IVIVC**	Power point presentations Discussion, chalkboard & case study	A1, A2, B1, B2 C1, C2, C3, D1, D2

References:

Main Textbook:

Applied Biopharmaceutics and Pharmacokinetics, Leon Shargel, MCgRAW Hill, 2017, 7th edition

Additional textbooks:

1. **Basic Pharmacokinetics**, Sunil Jambhekar and p-hilip Breen, Pharmaceutical Press, 2009, First edition.
2. **Winter's Basic and Clinical Pharmacokinetics,** Paul Beringer, Wolters Kluwer, 2017, 6th edition.

Dr. Rana Abutaima

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Assessment method	Date	Grade
Activity (Quizzes, presentations, seminars, assignments)	TBC	30%
Mid exam	TBC	30%
Final exam	TBC	40%