Pharmacy 408 (4 credits)

CLINICAL PHARMACOKINETICS

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Course Description:
This course is designed to assist the pharmacy student in gaining a greater appreciation of the application of pharmacokinetic principles in patient care situations. This course will consist of didactic instruction and workshops/case studies.

Learning Objectives:
Upon completion of the course, the student should be able to formulate dosing regimens, for a given drug, for patients encountered in clinical practice. The student should also be able to discuss various aspects of a drug's pharmacokinetic properties (absorption, distribution, metabolism, and excretion) and understand how these properties are affected by disease states, age, and other drugs. This course will also provide the student with an understanding of therapeutic drug monitoring, the use of plasma concentrations in clinical practice, and how to monitor a patient receiving these drugs. (Please refer to page 3 for a detailed list of outcome objectives).

2nd term (Jan 4-Jan 27, 2006)
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T, 13:00-17:00 Woodward IRC 5
W, 08:00-11:00 Chemical Engineering 224
Th, 13:00-17:00 CHBE 103
F, 08:00-11:00 Henry Angus 326

Date	Topic	Lecturer
Wed Jan 4	Course Introduction, Introduction to Clinical Pharmacokinetics, Review of Pharmacokinetic Principles (08:00-09:50)	M. Ensom
Thurs Jan 5	Review of Pharmacokinetic Principles	M. Ensom
Fri Jan 6	Review and Application of Pharmacokinetic Principles Creatinine and Renal Function, and Quiz Review Aminoglycosides	M. Ensom
Tues Jan 10	Quiz (Jan 4-6 material) (13:00-14:00) Aminoglycosides, Aminoglycoside Case Studies	M. Ensom
Wed Jan 11	Aminoglycoside Case Studies (08:00-09:50)	M. Ensom
Thurs Jan 12	Vancomycin and Vancomycin Case Studies	M. Ensom
Fri Jan 13	Vancomycin Case Studies and Exam Review	M. Ensom
Tues Jan 17	MIDTERM EXAM (Jan 6 - 12 material) (13:00-16:00)	M. Ensom
Wed Jan 18	Digoxin (09:00-10:50)	S. Shalansky
Thurs Jan 19	(Cytochrome P450 and Drug Interactions – reading) Nonlinear/Michaelis Menten Pharmacokinetics Phenytoin	M. Ensom
Fri Jan 20	Phenytoin and Phenytoin Case Studies (08:00-09:50)	M. Ensom
Tues Jan 24	Theophylline and Theophylline Case Studies	M. Ensom

Wed Jan 25	Theophylline Case Studies and Other Drugs (08:00-09:50)	M. Ensom
Thurs Jan 26	Exam Review	M. Ensom
Fri Jan 27	FINAL EXAM (**Jan 4 – Jan 26** material)	M. Ensom

Marks:

Quiz (1h)	20
Midterm (3h)	35
Final (3h)	45
Total	100

Suggested textbooks:

Burton ME, Shaw LM, Schentag JJ, Evans WE (eds): Applied Pharmacokinetics & Pharmacodynamics. 4th edition. Lippincott Williams & Wilkins, Baltimore, MD. 2005

Evans WE, Schentag JJ, Jusko WJ: Applied Pharmacokinetics. Principles of Therapeutic Drug Monitoring. Vancouver (WA), Applied Therapeutics, Inc., 3rd ed. 1992.

Roland M, Tozer TN: Clinical Pharmacokinetics: Concepts and Applications. Philadelphia, Williams & Wilkins, 3rd ed. 1995.

Winter ME: Basic Clinical Pharmacokinetics. Vancouver (WA), Applied Therapeutics, Inc., 3rd ed. 1994.

Grading and class policies:

1. Exams - Each student is expected to attend each at the date and time specified. If a student cannot attend an exam (for verifiable illness, personal or family emergencies), one opportunity will be given for a make-up (the date, time and place to be agreed upon by the student and instructor). Failure to attend a scheduled make-up will result in a zero grade for that exam.

   Each student has the right to challenge a grade. However, the instructor reserves the right to re-examine the entire exam. The student will receive the re-corrected exam on the next class day.

2. Homework - Homeworks will be assigned throughout the course period. Students will not be expected to hand in homeworks, but are encouraged to complete them. An answer key will be provided. (Some keys contain only the final answer; others solve the problem in a step-by-step manner).

3. Class Participation - Students will be called on throughout the course to answer and/or discuss relevant questions and case studies. Subjective appraisal of student performance in class discussions may be used to determine final letter grades (e.g., A, B, C, etc.) in borderline cases.

4. Review Sessions - Voluntary review sessions will be held on an as-needed basis, based on students' request. During these sessions, we will review any material covered to-date (eg. concepts, cases, problems, etc.)

Outcome Objectives
Pharmacy 408 Clinical Pharmacokinetics

1. Devise an initial dosage regimen and monitoring strategy, using pharmacokinetic principles and methods, for drugs with a narrow therapeutic range or marked variability in their disposition (including, but not limited to aminoglycosides, vancomycin, phenytoin, digoxin, and theophylline). In other words, be able to identify a dosage regimen based on pharmacokinetic principles and patient characteristics before obtaining drug concentrations.

2. Recommend modifications in drug therapy based on the changes in the patient's condition that alter drug kinetics. Recommend appropriate revisions in drug therapy using pharmacokinetic principles when appropriate (eg. any untoward drug effect has been detected, desired drug concentration not achieved, or therapeutic endpoint not achieved).

3. Demonstrate competency in devising individualized dosage regimens using pharmacokinetic models and handheld calculators. In other words, be able to calculate an optimal dosage regimen for an individual patient using available drug concentrations with the appropriate pharmacokinetic method.

4. Understand the theoretical basis for each pharmacokinetic monitoring method, so that calculations and recommendations are possible even when collected data are suboptimal or non-simulated (eg. when samples are not collected on time or when obtained prior to steady-state attainment).

5. Recommend the adjustment of dosage regimens in response to drug concentrations or other biochemical or clinical markers (eg. serum albumin, creatinine clearance, etc.).

6. Recommend appropriate blood sampling times and prevent over-frequent or inappropriate routine monitoring.

7. Describe the clinical manifestations of the potential toxicities associated with a patient's medication (listed in 1. above), assess the cause of toxicity, and recommend the appropriate course of action.

8. Apply pharmacokinetic principles to therapeutic agents for which serum concentrations are not routinely monitored.

9. Identify those patients who are likely to derive maximal benefit from clinical pharmacokinetic monitoring and for any given patient on any drug for a particular indication, decide whether clinical pharmacokinetic monitoring is warranted.