Detailed Outline and Assigned Readings

*****CHECK WEBSITE FOR UPDATED READING ASSIGNMENTS*****

April 1  Section 1: Principles of Pharmacology  Smith
Introduction to basic principles that determine the usefulness of compounds as drugs. Topics will include Pharmacokinetics and Pharmacodynamics: The Dynamics of Drug Absorption, Distribution, Action, and Elimination: Clinical Pharmacokinetics, Distribution, Pharmacodynamics, Mechanisms of Drug Action and the Relationship between Drug Concentration and Effect, Quantitation of Drug–Receptor Interactions and Effects

Readings:
- Winquist et al. 2014. The fall and rise of pharmacology--(re-)defining the discipline?

April 3  Section 2: Drug Transport and Drug-Target Interactions  Smith
Basic principles of molecular pharmacology, including Molecular Basis of Pharmacologic Selectivity, Membrane Transporters in Therapeutic and Adverse Drug Responses, Genetic Variation in Membrane Transporters, Implications for Clinical Drug Response, Drug Action in the Brain, Blood–Brain Barrier and Blood–CSF Barrier.

Readings:
- Winquist et al. 2014. The fall and rise of pharmacology--(re-)defining the discipline?

April 8  Section 2: Targets for Pharmacological Develop  Camps
How physiological states such as aging or inflammation can be targeted as a means to develop drugs for prevention and treatment of variety of diseases.
Readings:
- Tabas and Glass, 2013. Anti-Inflammatory Therapy in Chronic Disease: Challenges and Opportunities.
- Johnson et al., 2013. mTOR is a key modulator of ageing and age-related disease.
- Gabuzda and Yankner, 2013. Inflammation links ageing to the brain.

April 10  Section 3: Drug Metabolism  Smith
Metabolism of foreign chemicals and the regulation of foreign compound-metabolizing enzymes in humans. Phases and Sites of Drug Metabolism, The Role of Xenobiotic Metabolism in the Safe and Effective Use of Drugs, Induction of Drug Metabolism, Role of Drug Metabolism in the Drug Development Process.

Readings:
- G&G Chapter 3. Drug Metabolism.
- Li and Jia, 2013. Cometabolism of microbes and host: implications for drug metabolism and drug-induced toxicity.

April 22  Section 3: Science of Drug Therapy  Smith
Evaluation of the Evidence, Patient-Centered Therapeutics, Genomic Basis of Pharmacogenetics, Determinants of Inter-individual Variation in Response to Drugs, Interactions between Drugs, Genetic Determinants of the Response to Drugs.

Readings:
- G&G Chapter 4. Pharmacogenetics
- G&G Chapter 5. The Science of Drug Therapy
- Roses et al. 2014. New applications of disease genetics and pharmacogenetics to drug development.

April 24  Section 3: Adverse Drug Reactions and Toxicity  Smith

Readings:
- G&G Chapter 64. Principles of Toxicology and Treatment of Poisoning
- McKoy et al., 2013. Results from the First Decade of Research Conducted by the Research on Adverse Drug Events and Reports (RADAR) Project
April 29  Section 3: Toxicity Assessment of Candidate Drugs  Lee
Candidate drug toxicity assessment to inform development decisions and address FDA requirements.

Readings:
- Bussiere et al., 2009. Alternative Strategies for Toxicity Testing of Species-Specific Biopharmaceuticals.

May 1  Section 4) Medicinal Chemistry, Candidate Drug Discovery  Lokey
Topics in medicinal chemistry, including structure-activity relationships, fragment-based approaches, and lead optimization to improve pharmacokinetics.

Readings:

May 13  Section 5) Drug developments to improve pharmacokinetics  Berman
Immunoadhesins: A strategy to convert cell surface receptors into drugs with long half-lives.

Readings:
- TBD

May 15  Section 5) Drug Discovery: Pharmacotherapies for diabetes  Kaplan
Identification of endogenous molecules for the treatment of diabetes

Readings:
- Bradley et al., 2001. The emerging role of the intestine in metabolic diseases

May 20  Section 5) Drug Discovery: Antiinflammatory pharmacotherapies  Holman
Human lipoxygenase is becoming an increasingly interesting enzyme with respect to human disease, however much more science is needed to determine if it will become a viable therapeutic. In this lecture, Prof. Holman will discuss the successes his laboratory has had in developing a high-throughput screen, discovering "lead" molecules, optimizing them for potency/ selectivity and most importantly how they can be used as tools to understand the role of lipoxygenase in human diseases, such as diabetes, blood coagulation and stroke. Suggested reading comprises a few review articles on lipoxygenase.

Readings:
May 22  
Section 6) Process Design and Production of Drugs    Chamow**
Assessment of the drug approval process, including the FDA requirements for approving a biological drug, that include how Biotech companies will produce needed quantities of the drug.

Readings:
- Reichert. 2012. Which are the antibodies to watch in 2012? mAbs 4, 1-3.

May 27  
Pharmacotherapies of ADHD    Smith
ADHD neuropsychiatric disorders, and basis for clinical therapies.
- Contini et al., 2013
- Volkow et al 2005
- Hodgkins et al., 2012
- Challman and Lipsky, 2000
- Feldman and Reiff, 2014

May 29  
Intellectual Property in Drug Development    Christopher Smith
Intellectual property rights are a critical aspect of drug development. An introduction to patent rights and their application to the pharmaceutical industry will be presented.

Readings:
- NY Times, 2011 Drug Firms Face Billions in Losses...
- Biosimilars 2012
- Enbrel 2011

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