

Mechanisms of Hormone Action and Signal Transduction
(GS130024)
Spring 2007

Course Coordinator: **Richard B. Clark**
e-mail: Richard.B.Clark@uth.tmc.edu
Room: MSB 5.036 Time: MWF 2:30-4:00

I. Second Messenger Systems, 7TM Receptors, G proteins, Effectors (Adenylyl Cyclase, PLC, cG-PDEase)

Jan 8	GPCR signaling cascades Phototransduction as a model GPCR signaling pathway Classification of receptors	Kevin Ridge
Jan 10	Receptor Structure and photointermediate states Dimerization, ligand binding and activation G protein independent signaling GPCRs and disease	Kevin Ridge
Jan 12	Structural aspects of G protein signaling Covalent modifications Oncogenic mutations and disease Alpha & $\beta\gamma$ subunit structure/function/effectors	C. Dessauer
Jan 15	HOLIDAY	
Jan 17	GAPs: Regulators of G-protein signalling (RGS) Structures/assays/mechanisms/regulation GGL domains; RGS9 G protein effectors; structure/regulation	C. Dessauer
Jan 19	Additional Complexities of G protein regulation GDI/Goloco motifs Downstream effectors	C. Dessauer
Jan 22	Ligand binding: Partial/Inverse Agonists	V. Jayaraman
Jan 24	Localization/feedback of cAMP signals	T. Rich
Jan 26	Turnover of cAMP Phosphodiesterases	T. Rich
Jan 29	Desensitization of GPCRs GRKs and Arrestins	R. Clark
Jan 31	EXAM I	

II. Ion channels, Ca⁺⁺, Second Messenger Regulated Protein Kinases, and Phosphorylation

Feb 2	Membrane potential/cellular excitability	V. Jayaraman
Feb 5	Ion channel function/regulation	T. Walters
Feb 7	Ca ⁺⁺ homeostasis and Ca ⁺⁺ channels Hormonal regulation of PLCs	A. Morris
Feb 9	Protein kinases; General concepts Consensus sites/pseudosubstrates/AKAPs	J. Frost
Feb 12	Protein phosphatases Structure/regulation/localization of phosphatases	J. Frost
Feb 14	IP ₃ and Ca ⁺⁺ PKCs: Regulation by Ca ⁺⁺ and DAGs	A. Morris

III. Receptor Tyrosine Kinases

Feb 16	Ligand binding, mechanism of activation by autophosphorylation	V. Knutson
Feb 19	HOLIDAY	
Feb 21	Downstream signaling: protein docking	V. Knutson

IV. MAP-Kinase Cascades

Feb 23	Growth factor-regulated kinases Stress-activated kinases Localization of kinases	J. Frost
Feb 26	PAKs, AKT, P13K, PTEN	J. Frost

V. Non-Receptor Tyrosine Kinases

Feb 28	SRC family regulation and function	G. Gallick
Mar 2	EXAM II	

VI. Cell Cycle and Hormonal Control

Mar 5-9 Spring Break

Mar 12 Review of cell cycle J. Kuang
 Cell cycle engine
 Cyclin-dependent kinases and phosphatases
 Role of proteolysis

Mar 14 Hormonal Regulation of Cell Cycle J. Kuang
 Checkpoints, Role in DNA repair, cell division

VII. Apoptosis

Mar 16 apoptosis Timothy J. McDonnell

Mar 19 Caspase cascades Timothy J. McDonnell
 Role of Mitochondria

VIII. NO, cGMP, Guanylyl Cyclase

Mar 21 NO Discovery/function/regulation N. Bryan
Mar 23 NO “ “ N. Bryan

VIII. Cytokine Signalling

Mar 26 open

Mar 28 JAKS and STATS I Stan Stepkowski

Mar 30 JAKS and STATS II Stan Stepkowski

April 2 **EXAM III**

IX. Intracellular Signals and Regulation of Transcription

Apr 4 Nuclear receptor superfamily, hormone, S. Peleg
 General principles of signaling
 Experimental approaches

Apr 6 Structural Aspects of NR Function D. Loose
 Receptor-DNA interactions
 Hormone response elements

Apr 9 Regulation of transcription I D. Loose
 Basic transcriptional components
 Characteristics of pol II genes

Apr 11 Regulation of transcription II D. Loose

Remodeling chromatin and regulation
of transcription

- Apr 13 Regulation of transcription III
Transduction of steroid signaling by co-activators
and co-repressors D. Loose
- Apr 16 Stochastic Transcriptional Regulation M. Mancini
- Apr 18 Role of ligand I
Cellular and molecular mechanism of action of agonists
and antagonists S. Peleg
- Apr 20 CRB Retreat
- Apr 23 Role of ligand II
Design strategies, drug screening and clinical
applications of selective receptor modulators S. Peleg
- Apr 25 Orphan nuclear receptors and promiscuity of
ligand binding domains. S. Peleg
- Apr 27 Integrative mechanisms: Insight from Receptor
Knockout/transgenic studies, and Ligand-independent
regulatory pathways. M. Hu
- Apr 30 Discussion
- May 2 - May 6 **EXAM IV**