CAMB 698 - ELECTIVE TUTORIALS IN CELL BIOLOGY
FALL ‘08 OFFERINGS

CAMB 698, Elective Tutorials in Cell Biology, This tutorial course is designed to provide students with an in-depth knowledge of a specific topic in cell biology. The tutorial can be used to enable students to become more deeply acquainted with the literature related to their field of interest or to expand on a topic that the student found interesting in one of their basic courses. Interested students can choose from this list of faculty and proposed topics or make arrangements with faculty on their own. All arrangements, whether from the listing or independently set up, must be approved by the course director. Students taking the course will attend an initial organizational meeting (time and place TBA). Students will meet weekly with faculty mentors to discuss the literature, and in the end will write a brief review article and give an oral presentation.

Interested students should contact Jan Burkhardt:

Janis Burkhardt
Associate Professor or Pathology and Laboratory Medicine
Abramson Research Center 816D
Tel: 267-426-5410
jburkhar@mail.med.upenn.edu
MORRIS BIRNBAUM, PhD
Professor of Medicine and Cell Developmental Biology

“Regulation of cell metabolism”
Topics that might be available for more detailed study include the regulation of metabolism in mice and/or insects, mechanism of insulin action and/or signaling, biology of the fat cell and/or hepatocyte and membrane protein trafficking in adipose tissue and muscle.

CARSTEN BONNEMANN, MD
Assistant Professor, Departments of Neurology and Pediatrics

“Molecular and Cell Biology of Disorders of Muscle”
We will discuss various molecular mechanisms that can lead to muscle disease (myopathies and muscular dystrophies) - ranging from abnormalities of components of the cell nucleus, via the contractile apparatus to the plasma membrane and the extracellular matrix. In addition to highlighting the mechanistic aspects of these disorders, we will also touch upon current molecular treatment approaches to these disorders. Possible papers to discuss might include:

DISCHER, Dennis, PhD
Professor of Chemical & Biomolecular Engineering & Bioengineering

“Cell Mechanics”
We will discuss physical signals the cell receives as it interacts with its environment. We will discuss topics covering techniques used to measure and manipulate mechanical interactions between cells and their matrix, as well as the impact of these interactions on cell phenotype. Topics will range from effects on cytoskeleton dynamics to stem cell differentiation and development. Papers might include:


GEWIRTZ, Alan, MD
Professor of Hematology/Oncology

“c-myb and its role in human hematopoiesis”
The c-myb proto-oncogene is the founding member of a family of genes, A-Myb, B-Myb, and c-Myb, which encode transcription factors that regulate genes important for lineage fate, cell proliferation, and maturation. In hematopoietic cells, c-myb is required for normal cell development as demonstrated by the fact that homozygous c-myb null mice die in utero ~D15 of severe anemia and silencing c-Myb expression in vitro interferes with normal myeloid colony formation. c-Myb’s role in lineage determination is illustrated by recently described transactivation domain mutations that are associated with marrow megakaryocyte hyperplasia and profound thrombocytosis. Other important functions are alluded to by the observations that disrupting c-Myb expression with dominant negative mutants interferes with cell cycle progression and sensitizes leukemia cells to DNA damaging agents. It is becoming increasingly accepted that Myb function is also dependent on cell type and context. Much remains to be learned about regulation of Myb expression and its functions in normal and malignant human hematopoiesis. This tutorial will familiarize the student with Myb biology and suggest avenues
of investigation that should lead to a greater understanding of this transcription factor's role in normal blood cell development and malignant transformation. Suggested Readings:

9. Thomas MD, Kremer CS, Ravichandran KS, Rajewsky K, Bender TP. c-Myb is critical for B cell development and maintenance of follicular B cells. Immunity. 2005;23:275-286.
HANKENSON, Kurt, VMD, PhD
Assistant Professor of Cell Biology

“Regulation of the osteoblast-lineage by autocrine and paracrine factors”
Bone is formed by osteoblasts, which are derived from precursors that have been referred to as “mesenchymal stem cells” – MSC. These cells also differentiate to become adipocytes and chondrocytes. A strong reciprocal relationship exists between adipocytes and osteoblasts; thus, factors that are pro-osteogenic are most commonly anti-adipogenic. We will read about signaling pathways activated by paracrine and autocrine factors, such as Notch, Wnt, and BMP, that regulate osteoblast differentiation and consider the impact that these pathways have on progenitor pool maintenance. Papers might include:


HOLZBAUR, Erika, PhD
Professor of Physiology

“Microtubule Motors from cell biology to disease mechanisms”
We will discuss the cell biology, biophysics, and regulation of intracellular microtubule motor proteins kinesin and cytoplasmic dynein. We will focus on how these motors function in the cell, and how dysfunction of these motors may contribute to neurodegenerative disease.

Papers might include both classic work describing the key intracellular motors, and more recent work linking motor dysfunction to neurodegenerative disease:

LIPSCHUTZ, Josh, PhD
Assistant Professor, Department of Medicine

“Cell Biology of Polycystic Kidney Disease”
We will discuss the pathogenesis of polycystic kidney disease, the role of the primary cilium in cystic kidney disease, factors involved in the biogenesis of primary cilia, and trafficking of proteins to the primary cilia. Papers might include:


MALYKHINA, Anna P., PhD,
Department of Surgery, Division of Urology

“Molecular mechanisms of neurotransmission in gastrointestinal smooth muscle”
We will discuss the role of different ion channels expressed in Interstitial Cells of Cajal (ICC) and smooth muscle cells, ion channel-receptor coupling, modulation of ion channel function by various protein kinases, adhesion molecule chemokines, tachykinins; changes in smooth muscle signaling triggered by ischemia and/or inflammation. Papers might include:


MARKS, Michael, PhD
Associate Professor, Department of Pathology and Laboratory Medicine

“Biology and cell biology of multivesicular bodies”
Multivesicular bodies are endosomal structures bearing intralumenal membrane vesicles that form from invagination of the endosomal limiting membrane. They function in a variety of processes including lysosomal degradation, exosome secretion, virus budding, lysosome-related organelle biogenesis, and development. We will focus on papers that delve into the mechanism of MVB formation and the role of MVBs or MVB forming machinery in various biological processes. Recent papers that might be studied would include:


PURE, Ellen, PhD
Professor, Molecular and Cellular Oncogenesis Program and Immunology, Wistar Institute

**Topic 1: “Inflammation and cancer”**

Inflammation is a double-edged sword in cancer. We will discuss the molecular basis by which chronic inflammation promotes tumorigenesis as well as the mechanisms of anti-tumor immunity.


5. Dung-Fang Lee, Hsu-Ping Kuo, Chun-Te Chen, Jung-Mao Hsu, Chao-Kai Chou, Yongkun Wei, Hui-Lung Sun, Long-Yuan Li, Bo Ping, Wei-Chien Huang, Xianghuo He, Jen-Yu Hung, Chien-Chen Lai, Qingqing Ding, Jen-Liang Su, Jer-Yen Yang, Aysegul A. Sahin, Gabriel N. Hortobagyi, Fuu-Jen Tsai, Chang-Hai Tsai, and Mien-Chie Hung. IKKbeta Suppression of TSC1 Links Inflammation and Tumor Angiogenesis via the mTOR Pathway. *Cell*. 2007. 130:440-455 PMID: 17693255


**Topic 2: “Tumor Stromagenesis”**

The tumor microenvironment provides critical signals that regulate transformation and tumor progression. We will discuss stromal fibroblasts, extracellular matrix, angiogenesis and hypoxia and
the mechanisms by which the impact transformation, tumor invasion, tumor dormancy and tumor metastasis.


SHORTER, James, PhD
Assistant Professor of Biochemistry and Biophysics

“Prion function in health and disease”
(1) Are prions invariably pathogenic? (2) How can aggregated proteins be returned to function? 3) How are yeast prions inherited? References:


ZARET, Kenneth, PhD
Senior Member, Basic Science Division, Fox Chase Cancer Center
Adjunct Professor, Department of Genetics, U. Penn. Medical School

“Structure, organization, and function of nuclear chromatin”
We will read about the latest studies on the higher order structure of interphase and mitotic chromatin, particularly in relation to emerging research indicating how large-scale repressed and activated regions of the genome are organized. We will cover the roles of small RNAs, noncoding strand transcription, and other factors being discovered to generate heterochromatic regions, as well as the potential role of transcription factories and the relationship between gene localization in the nucleus and activity. This class will investigate the function of the genome from a cell biological perspective.
“Biological function of ADAM and ADAMTS family”
ADAM and ADAMTS are members of a disintegrin and metalloprotease (ADAM) and a disintegrin and metalloprotease with thrombospondin type 1 repeats. They consist of 33 members in ADAM family and 20 members in ADAMTS family. The biological functions involve cell adhesion, migration, proliferation, reproduction, cancer and thrombosis. We will read about the classification, tissue origin, structure-function and biological function of many members of these two related family. Papers might include: