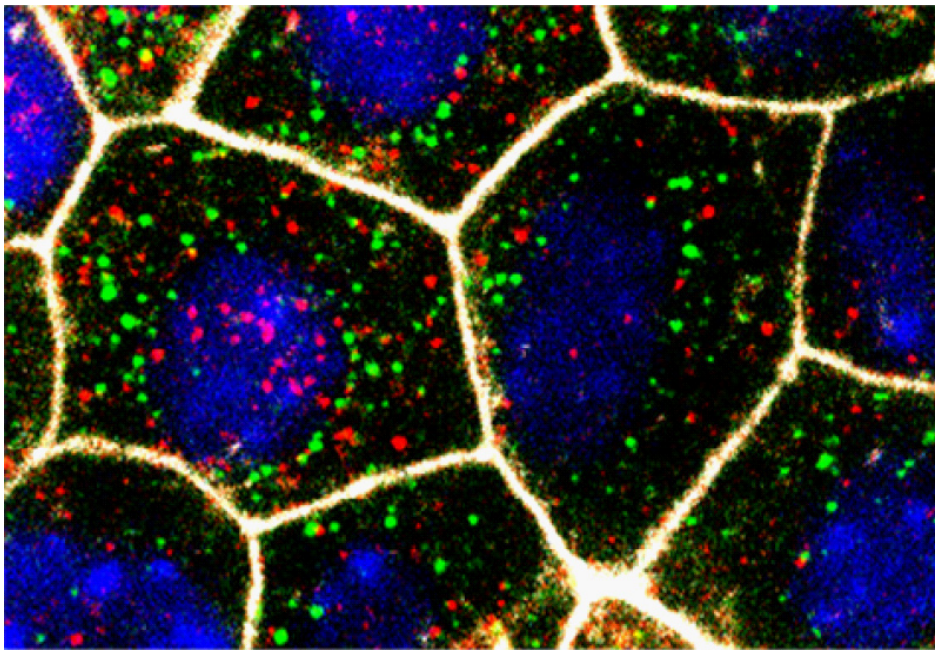
UNIVERSITY OF PITTSBURGH
SCHOOL OF MEDICINE

CELL BIOLOGY AND PHYSIOLOGY



FY10 ANNUAL REPORT
AND
FY11 BUSINESS PLAN

Front Page
Cover figure by Dr. Michael Butterworth. Co-immunofluorescent labeling of ENaC (green) and Rab11 (red) vesicles in mouse kidney epithelial cells. Rab11b regulates ENaC recycling in these cells.

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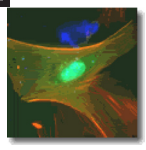


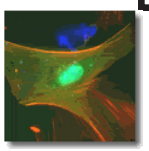
Department of Cell Biology and Physiology

In the cell, life is governed by a multitude of molecular systems that shape and sustain the organellar organization of the cell, maintain cellular homeostasis and respond to extracellular cues. These systems are dynamic, multicomponent macromolecular complexes. Maintaining and regulating correct function of these complexes is essential for normal cell motility, growth, division, differentiation and programmed death. Dysregulation inevitably leads to an aberrant cell behavior and commonly disease. Understanding the structure, function and interactions of these complexes and the underlying mechanisms by which they regulate organelles and other cellular compartments lie at the core of Cell biology. The faculty in the Department of Cell Biology and Physiology employs an interdisciplinary approach to address a broad spectrum questions in Cell biology from the roles of single molecules to through complex multicomponent cellular mechanisms to integrated studies at the organismal level in the fly, fish and mouse. The research in the department involves translation of the thorough understanding of fundamental cell functions into better comprehension of the disease mechanisms and development of therapeutics.

The Department of Cell Biology and Physiology is one of eight basic science departments in the School of Medicine. Members of our Department benefit from close and collegial interactions with researchers in other Departments, and with basic scientists in the School of Arts and Sciences at the University of Pittsburgh and at Carnegie-Mellon University. The Department is comprised currently of fifteen faculty with active federally funded research programs. Grant revenue to the Department has more than quadrupled during the last decade. Members of our faculty are active in both the medical and graduate school curricula, in curriculum development and student recruitment and mentoring. The graduate program in Cell Biology and Molecular Physiology is part of the Interdisciplinary Biomedical Graduate Program (IBGP) (http://www.gradbiomed.pitt.edu/) and led by our department faculty. We teach extensively in the Cell Biology Block, which comprises approximately one-third of the first year graduate course, Foundations of Biomedical Science. Our flagship course departmental offering, "Cell Biology of Normal and Disease States", is required of all students entering the program, and further information can be found at our departmental website (see: http://www.cbp.pitt.edu). The course has been recently revised to include exciting areas in modern cell biology as well as clinical conditions that arise from defects in these processes. Overall, the School of Medicine graduate program has more than 300 students currently working toward the PhD, and includes students in the newly formed HHMI-funded Computational Biology program, Neuroscience Program, the Program in Integrative Molecular Biology, and the Structural Biology/Molecular Biophysics graduate program. Several of our faculty are members of these newly formed programs as well.

The department is housed in administrative and research space in the South Wing of the Biomedical Science Tower (SBST). We also have satellite laboratories in the Childrens Hospital and the Hillman Cancer Institute. Our modern facilities and support cores provide the faculty with space designed to optimize their research efforts.

Faculty member featured in this Report: Dr. Michael Butterworth, Ph.D.
For several years Dr. Butterworth has focused his research on understanding the regulation of the epithelial sodium channel (ENaC) by trafficking and recycling mechanisms. His previous work demonstrated that this channel is trafficked from an intracellular compartment to the membrane surface of kidney epithelial cells in response to hormonal stimulation. To further characterize the

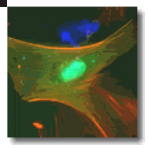


regulation of ENaC, the role of small GTPases and deubiquitinating enzymes (DUBs) in ENaC recycling was investigated. From this work a unique DUB, UCH-L3 was identified to be involved in ENaC recycling. Research in the Butterworth lab now falls into two major categories. First, ongoing studies aim to characterize the mechanisms that underlie trafficking of three renal transporters, namely the epithelial sodium channel (ENaC), potassium channel (ROMK) and aquaporin water channels. The work aims to map the intracellular itinerary of these channels to highlight areas of common and divergent regulation and determine protein mediators that regulate channel surface density. In separate, but related studies, primary human bronchiolar epithelial cells are used to characterize ENaC regulation in the human distal airway, in particular mechanisms which may contribute to disease states like cystic fibrosis.

The second research area investigates the regulation of ENaC by microRNAs (miRNA). miRNAs are small RNAs that pair to the mRNA of protein coding genes to direct their post-transcriptional repression. Channel density in epithelial cells is determined to a large extent by steroid hormone signaling. The regulation of miRNAs by these hormones and impact of changes in miRNA expression on channel trafficking is being studied.

Several images of data acquired over the years from Dr. Butterworth's work are included with this report.

Alexander D. Sorkin, Ph.D.
Chairman and Richard B. Mellon Professor
Cell Biology and Physiology



Department of Cell Biology and Physiology
2010 Research Activities

Biomedical research in the Department of Cell Biology and Physiology is directed at several major areas, as described below. The department is home of the School of Medicine's Center for Biological Imaging and the Cystic Fibrosis Research Center. The Department's major faculty groupings and research foci are summarized below.

Membrane Trafficking and Organelle Biogenesis

Meir Aridor
Michael Butterworth
Daniel Devor
Raymond Frizzell
Sandra Murray
Alexander Sorkin
Linton Traub

Scientists in this program are part of a larger "trafficking" community combining researchers from the School of Medicine, School of Arts and Sciences, and Carnegie Mellon University. The research is aimed at identifying the mechanisms of targeting of proteins and lipids to specific cellular compartments and at defining how these processes are disrupted in disease.

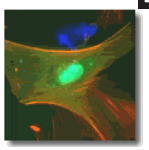
Regulation of Channels and Transporters

Michael Butterworth
Daniel Devor
Raymond Frizzell
Alexander Sorkin
Patrick Thibodeau
Christine Wu

Studies in this group aim at elucidating the physiological mechanisms underlying regulation of several ion channel and transporter proteins. Our approaches include biochemical, molecular, electrophysiologic, imaging, cell biologic and transgenic techniques. Inherited mutations in ion channels are responsible for many genetic diseases, including cystic fibrosis (CF). The department is home to a Translational Core Center in CF funded by the NIH and to a program grant from the CF Foundation.

Cellular Organization and Cell-cell Communications

Yang Hong
Sandra Murray
Donna Stoltz
Linton Traub
Simon Watkins

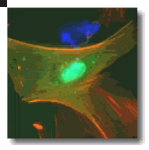


This group uses various state-of-the-art cell imaging, biochemical and genetic approaches to define the mechanisms involved in development and maintenance of epithelial cell polarity, regulation of gap junctions, angiogenesis and vasculogenesis, and various routes of functional communication between dendritic cells.

Regulation of Intracellular Signaling and Gene Expression

Peter Drain
Sanford Leuba
Alexander Sorkin
Yong Wan

Scientists in this group are examining signaling processes mediated by receptors for growth factors and hormones, mechanisms of hormone secretion, and processes involved in the regulation of cell cycle progression, DNA repair and transcription. The particular focus is on the events leading to dysregylation of cellular signaling networks leading in the disease such as cancer.



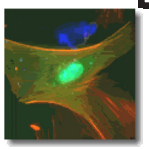
Center for Biologic Imaging

Over the last several years, microscopy as a scientific tool has reinvented itself. It has changed from a group of principally descriptive methodologies, to a wide range of primary tools and techniques to investigate the molecular organization of organs, tissues and cells. Advances in microscope and camera design, fluorescent dye technology and the development of fluorescent proteins as well as the advent of inexpensive, powerful computers have made the simultaneous resolution and quantitation of multiple concurrent molecular markers for both protein and DNA at a sub-micron resolution a reality. Furthermore, using these same systems, it is possible to probe living cells using a rapidly expanding repertoire of dyes sensitive to changes in cellular pH or the concentration of specific intracellular ions, and to optically section and rebuild images of cells in 3 dimensions using confocal microscopy. The development of nanometer sized particulate markers has been an essential extension of these techniques, allowing the distribution of proteins and mRNA to be studied within cells at a molecular resolution using electron microscopy.

The recognition of the potential utility of these techniques to the rapidly expanding research community here at the University of Pittsburgh School of Medicine led to the formation of a centralized microscope imaging center; the Center for Biologic Imaging (CBI), fifteen years ago. Since then the CBI has become an essential resource for most of the research programs within the medical school and collaborates extensively with most of the active research programs within the school.

Capacity of the Center:

The capacity of the Center is limited only by instrumentation, by space, and by staff within the center. Over the last year, the Facility has continued to expand. such that the base of imaging technologies has increased significantly, so that it now includes almost all cutting edge light microscopic, electron microscopic, and computer aided image analysis tools. The Center is split between the medical research facility of the UPSOM (in approximately 5500 sq ft. of space) and within the Hillman Cancer Center (700 sq ft). Both locations have been designed as dedicated, state of the art imaging facilities. The medical school location is the mainstay of the core and has fully equipped microscopy suites, computer labs, and wet and dry bench space for light and electron microscopic preparations. It incorporates a continuum of optical imaging technologies from routine histology to more exotic procedures such as EM, in situ hybridization and fluorescent imaging of live cells with multiple fluorochromes in 3 dimensions and time. The smaller, Hillman Cancer Center location houses basic confocal and immunofluorescence imaging facilities. In the last 2 years the CBI has successfully competed for new instrumentation for live cell (2 new systems), multicolor imaging, spectral confocal imaging (2 new systems), high speed confocal (3 systems) and multiphoton microscopy through the NCRR.. Furthermore, the Facility has supplemented its existing microscope and computer base with 2 new live cell imaging systems with microinjection capabilities. Currently the facility has 19 confocal microscopes of different types (point scanners, spinning disks, etc) 6 live cell systems (two with micro injection, 1 new multiphoton system, 4 high end upright microscopes and 3 electron microscopes (SEM and TEM). We also have multipe (30) online image processing work stations equipped with Metamorph,



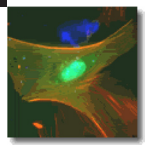
Elements, Imaris and Photoshop. Real time storage is 150 terabytes at gigabit speed and a half Petabyte tape library.

The Director: Dr. Simon C. Watkins was recruited to the University of Pittsburgh from the Dana Farber Cancer Institute (DFCI) in Boston in 1991 to provide scientific leadership of the Center. He is a tenured Professor in the Department of Cell Biology and Physiology within the School of Medicine. His experience in microscopic methods covers most of the present light and electron microscopic methodologies.

The Assistant Director: Dr. Donna Beer-Stolz is an Associate Professor in Cell Biology and Physiology. Her funded research interests are in liver regeneration and vasculogenesis. She has been the Assistant Director of the CBI for 12 years to this date. She was recruited specifically to facilitate interactions between the Cell and Tissue Imaging Core and its users. Dr. Beer-Stolz' primary role lies in the management and development of the electron microscopy component of the center.

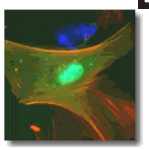
Other Faculty
Dr. Katy Baty is another faculty in the Center for Biologic Imaging as director of live cell imaging; her expertise is in cardiac myocytes and RNA trafficking within these cells. Another faculty who has become closely involved in the Center is Dr. Claudette St. Croix. Dr. St. Croix has research interests focused around the application of live cell and tissue imaging to the lung and pulmonary physiology

Postdoctoral Research Associates:
Technical Specialists: The technical bases of the Center are all trained microscopists; in total 15 technical specialists work in the center. Furthermore we have a staff of three research assistants who provide general lab maintenance and digital imaging services. These staff are responsible for the processing and experimental manipulation of materials for light and electron microscopy. They assist users directly in the application of microscopic techniques, though equally they perform complete procedures for users who are not sufficiently experienced to perform their own experiments. They are also responsible for the day-to-day running of the Center, including management of microscope usage, microscope maintenance,



bookkeeping, solution preparation, etc.

Administrative assistance: The primary administrative responsibilities are in the preparation of grants, and the monthly billing of charge-back users, processing Center for Biologic Imaging purchase requisitions and other general administrative duties.



Cystic Fibrosis Research Center

Center Director: *Dr. Raymond A. Frizzell*

The Cystic Fibrosis Foundation established a Research Development Program Center for research in cystic fibrosis with a five-year, $2 million grant in 1997. It was renewed in 2002 and 2007. The primary goal of the Center is to focus the attention of new and established investigators on multidisciplinary approaches designed to improve the understanding and treatment of cystic fibrosis (CF). In creating this Center, the CF Foundation took advantage of unique opportunities present at the School of Medicine and the Children's Hospital at the University of Pittsburgh, including a large and accessible patient population for pre-clinical and clinical research and excellent availability of patient lung tissue due to a large volume of transplant activity. The University of Pittsburgh RDP Center is one of nine such Centers supported by the CF Foundation in North America.

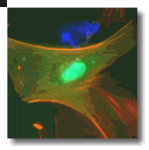
In addition to the RDP award, the Center was the recipient, in 2004, of a Core Center grant in CF from the NIH (P30 entitled, "Basic and Clinical Studies of Cystic Fibrosis"). Two such Centers were awarded nationally. The CF Research Center is directed by Raymond A. Frizzell, Ph.D., with extensive interactions with clinical colleagues and co-Director, Dr. Joseph Pilewski. The NIH Center supports pilot research projects and core facilities. The P30 award criterion was a research base of existing extramural grants awarded to Center investigators, which its Cores would support. The current Center is housed in the Department of Cell Biology and Physiology, 3rd floor BST South, 7th floor of the Rangos Research Center, Children's Hospital of Pittsburgh, and in the Adult Pulmonary Division of the Department of Medicine, 6th floor MUH.

The Center's research efforts focus on several areas relevant to the understanding and treatment of CF: basic studies of the function, protein interactions, trafficking and processing of the CF gene product, CFTR and its disease mutants; understanding the infection-inflammation issues that compromise the function of CF airways; the development of new therapies and diagnostic approaches for treating CF, and participation of Center investigators in clinical studies. Our funding mechanisms allow the Center to encourage interactions between investigators with long-standing interests and accomplishments in CF research and to bring new investigators into the CF field.

Research and Clinical Cores:

Molecular Biology/Gene Expression: The purpose of this core is to provide access to molecular reagents and techniques, to provide systems for gene expression, and standardized quality control. This core provides constructs for expression of CFTR, the amiloride-sensitive Na channel, ENaC, and various regulatory reagents and enzymes. It interfaces with facilities for functional assays and protein expression. [Core Director: Fei Sun, Ph.D., Cell Biology and Physiology]

Cell and Tissue Imaging Core: This core is housed within the Center for Biologic Imaging of the Department of Cell Biology and Physiology. It provides investigators within the RDP with access to state-of-the-art imaging techniques. Its primary focus is immunocytochemistry; in addition, the core has been involved in the development of new methods for measurements of ciliary beat

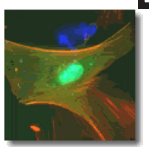


frequency, ciliary clearance, water permeability and the development of novel methods for detecting this low abundance protein in collaboration with investigators at Carnegie Mellon University. [Core Director: Simon Watkins, Ph.D., Cell Biology and Physiology]

Assay Core: The purpose of this core is to provide functional assays for CFTR and other proteins. Its assay menu includes fluorescence assays for anion permeability, transepithelial current, conductance, impedance and current fluctuation analysis in polarized airway or other epithelial cell cultures, both established cell lines and primary culture obtained from the Human Airway Cell Core (below). Facilities and personnel for performing whole-cell and single channel patch clamp measurements are also available. [Core Director: Carol Bertrand, Ph.D., Cell Biology and Physiology]

Human Airway Cells: This core provides access to patient materials obtained as a result of lung transplant activities in the Department of Surgery. This core offers procedures for cultured human airway epithelia, organotypic cultures and human airway cell xenografts, to facilitate a variety of pre-clinical investigations. It has supplied cells to various academic and industrial investigators involved in CF research [Core Director: Joseph Pilewski, M.D., Department of Medicine, Division of Pulmonary and Critical Care Medicine]

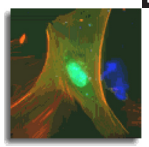
Clinical Studies: This core provides facilities and personnel for implementing clinical trials. It provides procedures for identifying functional outcomes, monitored in terms of lung function, ion transport, inflammatory mediator levels or gene expression. It maintains patient records and procedures for enrolling patients in clinical studies, and it interfaces with the larger clinical studies effort of the Cystic Fibrosis Foundation. [Core Director: Joseph Pilewski, M.D., Department of Medicine]

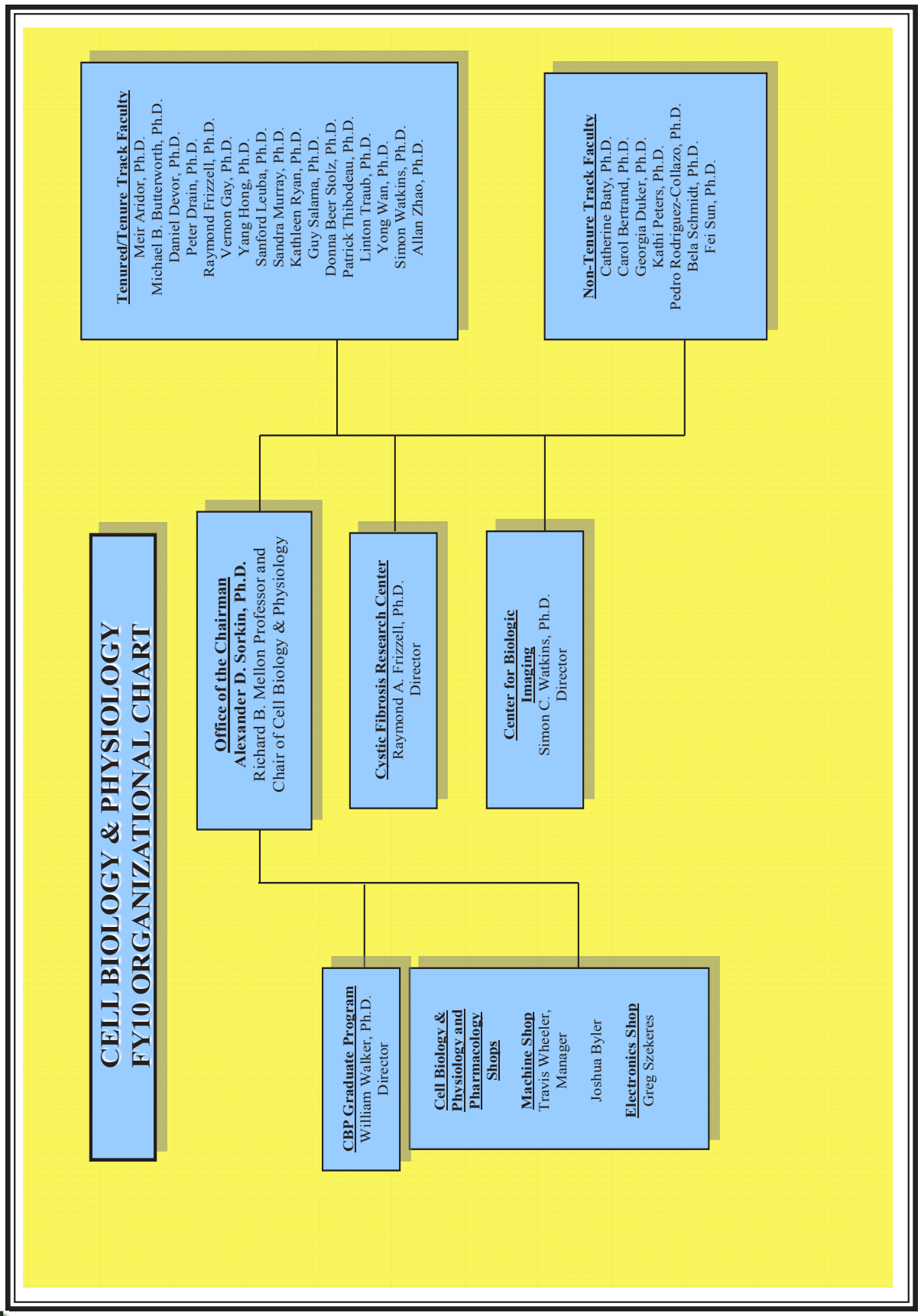


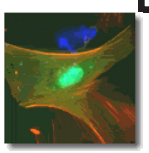
Cell Biology and Physiology Faculty Data

[Current as of June, 2010]

Name	Rank	Office Address	Email Address	Phone	Fax
Aridor, Meir	Associate Professor	S310 BST-South Wing	aridor@pitt.edu	412-624-1970	412-648-8330
Baty, Catherine	Res. Asst. Professor	S221 BST-South Wing	cjb16@pitt.edu	412-383-7264	412-383-8894
Bertrand, Carol	Res. Asst. Professor	S309 BST-South Wing	cbertra@pitt.edu	412-648-1044	412-648-8330
Butterworth, Michael	Assistant Professor	S314 BST-South Wing	michael7@pitt.edu	412-383-8591	412-648-8330
Devor, Daniel	Associate Professor	S312 BST-South Wing	dd2@pitt.edu	412-383-8755	412-648-8330
Drain, Peter	Associate Professor	S323 BST-South Wing	drain@pitt.edu	412-648-9412	412-648-8792
Duker, Georgia	Assistant Professor	322 Scaife Hall	gduker1@pitt.edu	412-648-9409	412-648-8330
Frizzell, Raymond	Professor	7117 RANCH	frizzell@pitt.edu	412-692-9449	412-692-9724
Gay, Vernon	Associate Professor	S321 BST-South Wing	vlgay@pitt.edu	412-648-9422	412-781-8059
Hong, Yang	Assistant Professor	S325 BST-South Wing	yhong@pitt.edu	412-648-2845	412-648-8330
Leuba, Sanford	Associate Professor	2.26g Hillman Cancer Center	leuba@pitt.edu	412-623-7788	412-623-4840
Murray, Sandra	Professor	S324 BST-South Wing	smurray@pitt.edu	412-648-9566	412-648-8330
Peters, Kathryn	Res. Asst. Professor	S363 BST-South Wing	kathi@pitt.edu	412-383-7845	412-648-8330
Rodriguez-Collazo, Pedro	Res. Asst. Professor	2.26g Hillman Cancer Center	pedrorc@pitt.edu	412-623-7788	412-623-4840
Ryan, Kathleen	Associate Professor	M302 Scaife Hall	ryankath@pitt.edu	412-648-8859	412-648-8330
Salama, Guy	Professor	S314 BST-South Wing	gsalama@pitt.edu	412-648-9354	412-648-8330
Schmidt, Bela	Res. Asst. Professor	S375 BST-South Wing	bes53@pitt.edu	412-383-7109	412-648-8330
Sorkin, Alexander	Professor and Chair	S368 BST-South Wing	sorkin@pitt.edu	412-624-3116	412-648-8330
Stolz, Donna Beer	Associate Professor	S221 BST-South Wing	dstolz@pitt.edu	412-383-7283	412-648-8330
Sun, Fei	Res. Asst. Professor	S363 BST-South Wing	fsun@pitt.edu	412-648-9468	412-648-8330
Thibodeau, Patrick	Assistant Professor	S327 BST-South Wing	thibodeau.pitt.edu	412-383-8858	412-648-8330
Traub, Linton	Associate Professor	S325 BST-South Wing	traub@pitt.edu	412-648-9711	412-648-8330
Wan, Yong	Associate Professor	2.6 Hillman Cancer Center	yow4@pitt.edu	412-623-3275	412-623-7761
Watkins, Simon C.	Professor	S225 BST-South Wing	swatkins@pitt.edu	412-648-3051	412-383-8894
Zhao, Allan	Associate Professor	S326 BST-South Wing	azhao@pitt.edu	412-648-8148	412-648-8330




CELL BIOLOGY & PHYSIOLOGY
FY10 ORGANIZATIONAL CHART
Tenured/Tenure Track Faculty
Meir Aridor, Ph.D.
Michael B. Butterworth, Ph.D.
Daniel Devor, Ph.D.
Peter Drain, Ph.D.
Raymond Frizzell, Ph.D.
Vernon Gay, Ph.D.
Yang Hong, Ph.D.
Sanford Leuba, Ph.D.
Sandra Murray, Ph.D.
Kathleen Ryan, Ph.D.
Guy Salama, Ph.D.
Donna Beer Stolz, Ph.D.
Patrick Thibodeau, Ph.D.
Linton Traub, Ph.D.
Yong Wan, Ph.D.
Simon Watkins, Ph.D.
Allan Zhao, Ph.D.
Non-Tenure Track Faculty
Catherine Baty, Ph.D.
Carol Bertrand, Ph.D.
Georgia Duker, Ph.D.
Kathi Peters, Ph.D.
Pedro Rodriguez-Collazo, Ph.D.
Bela Schmidt, Ph.D.
Fei Sun, Ph.D.
Office of the Chairman
Alexander D. Sorkin, Ph.D.
Richard B. Mellon Professor and
Chair of Cell Biology & Physiology
Cystic Fibrosis Research Center
Raymond A. Frizzell, Ph.D.
Director
Center for Biologic Imaging
Simon C. Watkins, Ph.D.
Director
CBP Graduate Program
William Walker, Ph.D.
Director
Cell Biology & Physiology and Pharmacology Shops
Machine Shop
Travis Wheeler, Manager
Joshua Byler
Electronics Shop
Greg Szekeres



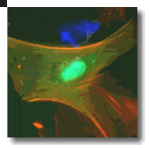
Cell Biology and Physiology
Research Seminar Schedule 2009-2010

September 29, 2009
Hongtao Yu, Ph.D.
Professor, HHMI Investigator
Department of Pharmacology, University of Texas SW Medical Center, Dallas, TX
"The Spindle Checkpoint"

October 6, 2009
Christine Wu, Ph.D.
Assistant Professor
Department of Pharmacology, University of Colorado, Denver, CO
"Towards the Comprehensive Characterization of the Membrane Proteome"

October 20, 2009
Jean Pierre Vilardaga, Ph.D.
Assistant Professor
Department of Pharmacology & Chemical Biology, University of Pittsburgh
"PCR studies in live cells: What we have learned"

December 17, 2009
Fabrizio Barbetti, Ph.D.
Associate Professor
Clinical Biochemistry & Molecular Biology, University of Rome Tor Vergata
"Monogenic diabetes: The Italian Experience"



Faculty Research Interests

Meir Aridor, Ph.D.
Associate Professor

The endoplasmic reticulum (ER) is the first compartment of the secretor pathway. Plasma membrane receptors, ion channels, hormones and secreted enzymes are few examples of proteins which are being processed and sorted for vesicular transport in the ER. Mistakes in sorting lead to the development of variety of diseases, ranging from hemochromatosis, cystic fibrosis or hereditary emphysema to Pelizaeus-Merzbacher or Alzheimer's neuro-degeneration. Viruses such as the cytomegalovirus, HIV-1 Epstein-Barr and many others manipulate ER sorting to evade immune surveillance, a specialized function of the compartment. Dr. Aridor is utilizing a variety of molecular biochemical, biophysical and cellular techniques to unravel the molecular basis of ER sorting.

Catherine J. Baty, D.V.M., Ph.D.
Research Assistant Professor

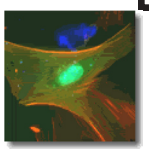
Our laboratory has begun focusing on lymphatic endothelial function. We have developed a 3 dimensional tissue culture system to study potential mechanisms of lymphatic failure. Despite the fact that the lymphatic vessels were identified hundreds of years ago, limited understanding exists of lymphatic development, function, and disease. Greater understanding of the structure and function of lymphatic endothelium will provide plausible new candidate genes for mutation screening in families with hereditary lymphedema. Such studies will ultimately reveal specific therapeutic targets appropriate both for those suffering from primary lymphedema and the greater population of patients with secondary lymphedema.

Carol A. Bertrand, Ph.D.
Research Assistant Professor

The primary research interests of the lab focus on the regulation of airway surface liquid (ASL) pH and mucin secretion in epithelia, and the involvement of ion channels in modulating the process. Both bicarbonate and mucin contribute to the pH of the ASL, which varies considerably in disease from acidic in CF to alkaline in chronic bronchitis. Current work centers on the biosynthesis and activity of chloride channels and anion exchangers that complement and may regulate the CFTR chloride channel, as well as the apical membrane permeability to bicarbonate. In addition, ongoing effort is devoted towards the development and refinement of methods for performing electrophysiology and live cell fluorescence microscopy.

Michael B. Butterworth, Ph.D.
Assistant Professor

Dr. Butterworth's research interest is in the regulation of epithelial channels by vesicle trafficking and recycling. Research is focused into two broad areas. First, ongoing studies aim to characterize the mechanisms that underlie channel regulation by membrane trafficking in the mammalian kidney. Three renal transporters, namely the epithelial sodium channel (ENaC), potassium channel (ROMK) and aquaporin water channels are investigated. The work aims to map the intracellular itinerary of these channels and identify protein mediators that regulate

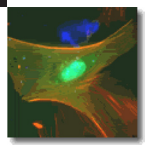


channel surface density. In separate, but related studies, primary human bronchiolar epithelial cells are used to characterize ENaC regulation in the human distal airway, in particular mechanisms which may contribute to disease states like cystic fibrosis. By comparing ENaC regulation in two distinct systems, areas of common and divergent regulation have been established. The second research focus investigates the regulation of ENaC by microRNAs (miRNA). miRNAs are small RNAs that pair to the mRNA of protein coding genes to direct their post-transcriptional repression. Channel density in epithelial cells is determined to a large extent by steroid hormone signaling. The regulation of miRNAs by these hormones and impact of changes in miRNA expression on channel regulation is being studied.

Daniel C. Devor, Ph.D.
Associate Professor

Intermediate (KCa3.1 or IK) and small (KCa2.3 or SK3) conductance, calcium-activated potassium channels play critical roles in a host of physiological processes, including the endothelial derived hyperpolarizing factor (EDHF) response which is critical to the maintenance of vascular tone and hence blood pressure regulation, the maintenance of a hyperpolarized membrane potential across the basolateral membrane of polarized epithelia required for transepithelial fluid secretion as well as being intimately involved in the afterhyperpolarization in nerves and a host of other processes. Thus, an understanding of the physiological and pharmacological regulation of these channels as well as their assembly, trafficking and gating is crucial to the development of novel therapies based on targeting these channels. The long-term goals of my lab are to obtain a detailed molecular understanding of these channels in order to unravel the mechanisms involved in their assembly, trafficking, regulation and gating as well as to define the physiological role these channels play using C. elegans as a model system. In light of these goals, we have several ongoing projects designed to further our understanding of these channels.

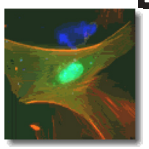
First, Mark Bailey, a graduate student in the lab, is carrying out patch-clamp studies designed to elucidate the role of S6 in the gating of KCa3.1. In these studies, we are employing PCMBS to probe the cysteines in S6 and evaluate their role in gating. PCMBS has advantages over MTS reagents in both the site of the reactive moiety as well as the size of the molecule such that a larger perturbation in local molecular space is achieved. By using PCMBS in combination with a mutagenesis approach we have demonstrated that side chains pointing away from the pore, and toward S5, are critical to the coupling between Ca2+ binding to the calmodulin binding domain and channel gating. In collaboration with Dr. Michael Grabe, of the Biological Sciences Department at the University of Pittsburgh, we are modeling the gating kinetics of KCa3.1 to extract the rate constants being affected by both PCMBs as well as mutations in this region of the channel. In the future, we plan to probe S5 by conducting a tryptophan scan of the region across from the cysteines in S6 to further our understanding of how S5-S6 interactions modulate the coupling between increasing Ca2+ and channel gating. We have also identified critical amino acids in the S4-S5 linker region of both KCa3.1 and the related family member KCa2.3 which, when mutated to increase side-chain volume, result in a shift in apparent Ca2+ affinity. These results suggest this region of the channel is similarly involved in the coupling between Ca2+ binding to calmodulin in the cytoplasmic C-terminus and subsequent gating. A combination of patch-clamping, mutagenesis and modeling will be employed to definitively define the role of this region of the channel in the coupling between Ca2+ and gating.



Second, as any physiological response is dictated by not only the likelihood that channels are in the open state (Po), i.e., gating, but also the number of actively gating channels (N), it is critical to understand how the number of KCa3.1 and KCa2.3 channels at the plasma membrane is maintained and regulated. To this end, Yajuan Gao and Corina Balut, two post-doctoral associates in the lab, recently developed novel biotin ligase acceptor peptide (BLAP)-tagged KCa2.3 and KCa3.1 constructs which allow us to evaluate, in real time, the endocytic fate of these channels. Using these constructs, we have developed three separate projects. In one project, our recent data demonstrates that KCa2.3 is rapidly endocytosed and enters the recycling pathway back to the plasma membrane in a Rab35/EPI64C (RabGAP)- and RME1-dependent manner. Indeed, our evidence points to the role of a 12 amino acid domain in the N-terminus of KCa2.3 as being critical in this process via an association with RME1. Future studies along these lines will be designed to elucidate the role of ubiquitination/de-ubiquitination in the recycling of this channel to the plasma membrane in addition to determining the role of agonists in regulating this process. We have also recently identified the Rab5 pathway as being critical to the endocytosis of KCa2.3, whereas endocytosis and recycling are independent of the Arf6 pathway. These results point to this being a dynamin and clathrin-dependent endocytic process, although Rab5 has also been shown to be important in clathrin-independent endocytosis. The mechanism by which KCa2.3 is endocytosed will be defined using a combination of imaging, protein biochemical mutagenesis and cell biological techniques.

In a related project to the one above, we have recently demonstrated that KCa3.1 is targeted to the lysosome via the ESCRT machinery. We have recently begun to utilize tandem ubiquitin binding entities (TUBES) to define the role of ubiquitinylation in this process. By combining BLAP tagging and TUBES we are able to rapidly assess the ubiquitination of plasma membrane channels and correlate ubiquitinylation with endocytosis. In this regard, we have now shown that the endocytosis of KCa3.1 is directly correlated with poly-ubiquitinylation of the channel. By inhibiting ubiquitinylation we are able to block the channels endocytosis. This was first identified using a 96-well plate assay to identify modulators of channel endocytosis and formed the basis of our upcoming publication in Future Medicinal Chemistry, detailing this approach. Future studies will continue to explore the role of ubiquitin in the endocytosis of KCa3.1 as well as determine whether this is a regulated process. For example, is this a classic K63-dependent ubiquitinylation process, or are other ubiquitin-linked side-chains involved? Can the endocytosis of KCa3.1 be modified by second messengers generated in response to agonist stimulation? Of course, we are also attempting to identify the deubquitinylating enzymes (DUBs) involved in ubiquitin removal as this is critical for both the proper degradation of KCa3.1 as well as the recycling of KCa2.3. In this regard, we have begun a collaboration with Dr. Christian Loch at LifeSensors. We have now screened KCa3.1 prior to and following endocytosis using a DUB CHIP and have identified USP8 and USP2 as being DUBs critical in the endocytosis of this channel. As both KCa2.3 and KCa3.1 enter dynamic endosomal compartments, modulation of the rate-limiting steps in these events will allow for the regulation of the number of channels present at the plasma membrane such that the physiological response to agonists may be modified.

Given that KCa3.1 is targeted to the basolateral membrane in polarized epithelia, where it plays a critical role in the generation of the electromotive driving force required for Ca2+-dependent agonists to stimulate Cl- and fluid secretion, an additional project, being undertaken in collaboration with Dr. Kirk Hamilton at the University of Otago in Dunedin, NZ, is designed to

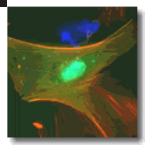


understand the mechanisms by which this channel is correctly targeted and endocytosed in various model systems, including FRT, MDCK and LLC-PK1 cells. In this regard, we have found that KCa3.1 is correctly targeted in each of these cell lines and that, similar to our studies on HEK cells and a microvascular endothelial cell line (HMEC-1), the channel is rapidly endocytosed. Further, we have generated chimeras between the C-terminal tail of KCa3.1 and the nerve growth factor receptor (NGFR, p75) and demonstrate that the C-terminus of KCa3.1 can redirect NGFR from its typical apical localization to the basolateral membrane in polarized epithelia. Future studies will be designed to elucidate the molecular motifs involved in the basolateral targeting of this channel as well as understanding the molecular mechanisms involved in the correct targeting of this channel to the basolateral membrane.

Fourth, in conjunction with our studies outlined above, we are using our BLAP-tagged channels to develop a 96-well plate assay to screen siRNA libraries to identify novel proteins involved in the endocytosis, recycling and lysosomal targeting of KCa2.3 and KCa3.1. By monitoring co-localization of these channels with a membrane marker over time we can determine whether knockdown of a specific protein influences the endocytic fate of these channels. Given the crucial role these channels play in a host of physiological processes it is anticipated that the identification of these novel proteins involved in maintaining plasma membrane localization will provide unique targets for therapeutic intervention.

While the majority of our studies are being carried out in HEK cells in order to facilitate an initial understanding of these processes which have not heretofore been studied in the context of KCa2.3 and KCa3.1, we similarly carry out crucial studies using the HMEC-1 microvascular endothelial cell line. One of our future aims is to develop a virus based infection system, such that the trafficking of these channels can be studied in confluent endothelial monolayers. This will not only allow us to gain a greater understanding of these channels in endothelial cells, but also afford us the opportunity to study the fate of these channels under more unique physiological situations, such as sheer stress.

Given our interest in understanding these channels at a tissue/model system level, Cavita Chotoo, a graduate student in the lab, in collaboration with Drs. Cliff Luke and Gary Silverman at Children's Hospital of Pittsburgh, is further defining the physiological role of one of these channels using C. elegans as a model system. A single C. elegans SK channel homologue was targeted for deletion and this KO animal displays a developmental delay phenotype. The exact nature of this phenotype is currently being studied. Cavita has also generated transgenic C. elegans lines expressing GFP- and RFP-tagged channels to determine both an expression pattern profile as well as to determine the effect of overexpression of this gene product on physiological function. Our data demonstrate that the C. elegans SK channel is expressed in both the gut as well as in numerous nerves, including the nerve ring, ventral nerve chord and ganglia in the tail. Future studies will elucidate the role of this SK channel in this model physiological system. Cavita has also begun to culture cells from her transgenic line which will allow us to define cells expressing the transgene and characterize these C. elegans channels by patch-clamping. We can then determine whether mutations at conserved amino acids to those identified by us in mammalian channels will produce similar phenotypes, including increased Ca2+ sensitivity; allowing us to evaluate the effect of a hyperactive phenotype on function at the level of an intact organism. Finally, we can utilize known endocytic/recycling phenotypes in C. elegans to probe the regulation of the number of channels (N) in a model system and determine how



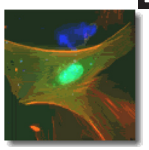
perturbations in N alter physiological function. These studies will tie together our efforts on heterologously expressed channels to our proposed studies on channels within the microvasculature; providing us with a clear picture of how KCa2.3 and KCa3.1 are regulated at the plasma membrane. Given the role of these channels in multiple disease processes, an understanding of how the number of channels is regulated at the plasma membrane is critical to understanding how these channels can be manipulated for therapeutic gain.

Peter F. Drain, Ph.D.
Associate Professor

Our laboratory studies cellular mechanisms underlying insulin secretion in health and disease. Currently, the experimental focus is on the cell biology of mutations and binding partners of two proteins that cause monogenic forms of diabetes:
(1) We are continuing our ongoing investigations into the structure-mechanism relations underlying the ATP-inhibited potassium (KATP) channel response to physiologically important ligands, ATP, ADP, and anti-diabetic sulfonylureas. In pancreatic beta cells, the KATP channel brings insulin secretion under the control of blood glucose levels. Our major goal is to establish the cellular mechanisms underlying how interactions of the KATP channel with its small molecular ligands and with its protein binding partners changes with high and low glucose metabolism, and consequent changes in insulin granule transport and exocytosis. Normally, the fraction of time the KATP channel spends in the inhibited state determines insulin secretory rates. When this regulation goes awry, serious complications at the whole-organism level lead to diabetes and other diseases. The research has fundamental importance to pharmaco-genetics, in which certain diabetic subjects with certain mutations can be transferred from insulin replacement therapy injected multiple times a day to an oral sulfonyluea pill once a day.
(2) Another key molecule in insulin secretion is insulin itself. Mutations in human proinsulin, the propeptide precursor to insulin, have been shown to cause clinical diabetes. In studying the associated cellular mechanisms underlying insulin biogenesis, trafficking, and secretion, we have combined confocal fluorescence microscopy and a novel molecular strategy to visualize insulin secretion in live cells. The Ins-C-GFP reporter has exploded our ability to look inside live insulin-secreting cells to study glucose-stimulated insulin biogenesis, vesicle transport and exocytosis. Using this approach we have localized KATP channels to the beta cell's large dense core vesicle (LDCV) where we have shown they mediate ATP- and glibenclamide-stimulated insulin secretion. In this way, the proteins whose mutation causes diabetes, the KATP channel and insulin, have a more intimate cell biological relationship and clinical pertinence than previous thought. Diabetic mutations in human insulin are used to study the beta cell biology of proinsulin trafficking, biogenesis, ER stress and protein degradation, and the consequences on insulin secretion. These investigations provide mechanistic details of the relationships between how KATP channels and insulin work together properly and fail to do so in diabetes. Trainees in our laboratory have the opportunity to combine the techniques of molecular genetics and confocal live-cell fluorescence imaging, with transgenic techniques to integrate understanding at the level of the molecule, organelle, whole cell, organ, and organism.

Georgia K. Duker, Ph.D.
Assistant Professor

My contributions to the University Of Pittsburgh School Of Medicine are primarily through



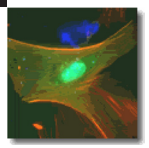
teaching. I contribute as a faculty member to twelve separate courses throughout the first and second years of the medical students' education. My responsibilities include course director, lectures, problem based learning sessions, microscopy laboratories and tutorial sessions. For seven of these courses, I direct the microscopy labs in normal histology. My photographs have been formed into slide-based lab sessions to cover many of the organ system studied. In resent years, a focus has been to contribute to the medical education web site: http://navigator.medschool.pitt.edu. Annotated Kodachrome collections now guide students through the renal, gastrointestinal, pulmonary, endocrine, musculoskeletal and reproductive systems. The entire Kodachrome collection is available to students in the Histology Resource Room adjacent to my office. Here, Kodachromes, glass slides, projectors, multiheaded microscopes and a variety of current texts are available for students to review material. In 2003, I served as the course director for the Cell Structure, Metabolism & Nutrition course. 2003-04 also saw my participation in both the Basic Science Task Force and the Organ Systems Task Force; these committees oversaw the restructuring of the first two years of the medical school curriculum. From 2004 through to 2009, I am a co-director for the second-year Digestion and Nutrition course.

Within the Department of Cell Biology and Molecular Physiology I am course director for the Graduate Histology course. This course is taken by the majority of our students. It is abroad survey of all the organ systems, focusing on structure/function correlations. For most students it is the only time they encounter a full body overview of systems beyond their own research. Graduate students within the Department of Cell Biology and Molecular Physiology may then serve as Teaching Fellows for the Histology labs within seven Medical School courses. One of my roles is coordinator of the Teaching Fellows, especially to oversee their training and preparation.

A third role has emerged for me as a School of Medicine Coordinator for the Undergraduate Honors College Program. In 2002, I created a new course, Biomedicine: Past, Present and Future. The course has been taught five times. I examine 12 significant biotechnologies via their history and future applications. Twenty-eight faculty from the School of Medicine were recruited to contribute. This course is one of three from the School of Medicine to form the core requirements for a new Certificate in the History of Medicine. The Certificate program, coordinated by Dr. Johnathon Erlen, will be offered through the Undergraduate Honors College. It is an inter-university program with course offering from the University of Pittsburgh, Duquesne University and Carnegie Mellon University. Students from all three universities are permitted to cross register for the courses. This is the first inter-university certificate program in Pittsburgh.

Raymond A. Frizzell, Ph.D.
Professor, Chairman of Department
Director of Cystic Fibrosis Research Center

Dr. Frizzell's interests concern the mechanisms of salt and water transport in secretory and absorptive epithelia and the regulation of these processes. Specifically, we are defining defects in ion transport regulation in the genetic disease, cystic fibrosis (CF), membrane trafficking of wild-type and mutant ion channel proteins, gene expression and therapeutic strategies. Since most CF is caused by the cellular destruction of misfolded mutant CF proteins, our main research efforts focus on defining the steps in the biogenesis of the CF protein (CFTR), and the quality control



checkpoints where mutant CFTR proteins go 'off-pathway' and are degraded by the proteasome. For example, we recently implicated a novel that extracts CFTR from the endoplasmic reticulum membrane, providing a checkpoint in the early recognition of the most common CFTR folding mutant. We are focusing our attention on other components of this complex, including the ubiquitin ligases with which it associates. In addition, we have identified novel chaperone interactions that selectively target the common CFTR folding mutant for degradation, thus implicating them as therapeutic targets for correcting mutant protein biogenesis. Finally, we have identified an
alternative anion channel at the apical membranes of airway epithelial cells. Its contribution to salt and water secretion across the airway is being assessed, as is its interaction with CFTR during their biogenesis. The activation of this channel could provide an alternative to CFTR for regulation of airway liquid properties.
We also study the regulation of epithelial sodium transport in airway epithelia and the distal nephron of the kidney. Our interests lie in identifying the factors that control the apical membrane density of the sodium entry channel, ENaC, and its insertion, retrieval and recycling at this critical step in sodium absorption. The role of ubiquitylation and 14-3-3 protein binding are current topics of interest in the regulation of both CFTR and ENaC trafficking, as defects in these processes produce cystic fibrosis and hypertension.

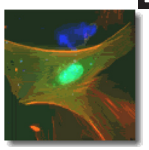
Vernon L. Gay, Ph.D.
Associate Professor

Dr. Gay began his training in reproductive endocrinology as a graduate student at Indiana University in Bloomington. While there he devised a technique for rapid transauricular hypophysectomy of rats and used available bioassays to obtain the first measurements of the half lives of endogenous LH and FSH in the rat.

For his post-doctoral work Dr. Gay moved to the University of Michigan in Ann Arbor at a time when radio-immunoassays for gonadotropins (LH and FSH) were first available. In addition to describing hormone profiles throughout the reproductive cycle of the female rat, he was one of the first to describe the phenomenon of pulsatile pituitary hormone secretion in any species (specifically the castrated rat).

In the early 1970's, Dr Gay moved to the School of Medicine at the University of Pittsburgh where he described the mating induced secretion of LH in cats. More recently, he has used an excitatory amino acid that is structurally related to the artificial sweetener "Aspartame" to induce pulsatile LH secretion and resultant precocious puberty in the rhesus monkey.

Dr. Gay's current interests are concerned with the neuronal networks that regulate pulsatile LH secretion in transgenic mice and in non-human primates. He has described a theoretical and highly speculative pattern of neuronal development that might serve to explain both the long delay and the rapid onset of sexual development (puberty) in primates (Rhesus monkey and human). In addition, he has recently participated in studies in which LH secretory patterns were monitored in transgenic mice expressing a green fluorescent protein in GnRH neurons. The failure of such female mice to exhibit pulsatile LH secretion suggests that the altered GnRH neuron may exhibit a reduced ability to modify synaptic connections following the removal of steroid negative feedback.



Yang Hong, Ph.D.
Assistant Professor

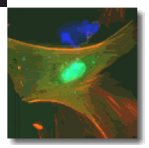
Establishing cell polarity is essential for cellular morphogenesis, function and tissue integrity. Using Drosophila epithelial cells as a model system, we aim to elucidate the fundamental mechanisms underlying the cell polarization by focusing on a group of so-called polarity proteins that play essential and conserved roles in regulating cell polarity. In order to systematically dissect their functions in Drosophila by genetic, cell biologic and proteomic approaches, we have developed a novel genetic tool termed "genomic engineering" that permits directed, efficient, and versatile modifications of a chosen genomic locus in Drosophila. Genomic engineering makes it possible for us to generate more than hundred novel knock-in alleles of polarity protein genes such as DE-Cadherin, Crumbs, Stardust and Lgl. These novel knock-in alleles include fluorescent protein knock-ins for live imaging assays, high-affinity epitope knock-ins for biochemical/ proteomic assays, and mutant alleles carrying defined point mutations and/or deletions for structure-function analyses. These engineered alleles of selected polarity proteins already allowed us to identify novel molecular and cellular mechanisms of cell polarity, such as the regulation of adherens junction dynamics by polarity proteins during cell polarization. In addition, these alleles helped us to discover a novel regulatory mechanism of polarity proteins by hypoxia.

Sanford H. Leuba, Ph.D.
Associate Professor

Since the discovery of the nucleosome in the early 1970's, scientists have sought to correlate chromatin structure and dynamics with biological function. More recently, we have learned that nucleosomes and chromatin play a critical role in the regulation of transcription, replication, recombination, and repair (Zlatanova and Leuba, 2004). Our laboratory uses an interdisciplinary approach combining the disciplines of molecular biology, biochemistry, engineering, and physics to try to understand at the single nucleosome and single chromatin fiber level how chromatin structure and dynamics regulate biological processes that use DNA as a template. To this end, we are applying several single-molecule approaches such as atomic force microscopy (AFM), magnetic tweezers, optical tweezers and single-pair fluorescence resonance energy transfer (spFRET) to native or reconstituted chromatin fibers of different protein compositions with the latter three methods using homebuilt instrumentation. Single-molecule techniques provide the sensitivity to detect and to elucidate small, yet physiologically relevant, changes in chromatin structure and dynamics. Recent examples of what we have been able to discover include the following:

- We have been able to use AFM to detect conformational changes in chromatin fiber structure due to the presence of 24 methyl groups per nucleosome (Karymov et al., 2001) implying that the combined action of the DNA methylation and linker histone binding required to compact chromatin may affect the transcription of large chromatin domains.

- We also used AFM to investigate the role of histone variants in chromatin fiber structure (Tomschik et al., 2001). Eukaryl and archaeal organisms have similar fiber structure with differences likely related to the more complex needs of eukaryl organisms to regulate transcription.



- We have used optical tweezers to determine the piconewton forces necessary to unravel individual nucleosomes in a fiber context (Bennink et al., 2001) and found that the measured forces for individual nucleosome disruptions are in the same range of forces reported to be exerted by RNA- and DNA-polymerases.

- We have used magnetic tweezers to observe a dynamic equilibrium between force dependent nucleosomal assembly and disassembly on a single DNA molecule in real time (Leuba et al., 2003) as a model of what happens to nucleosomes when a transcribing polymerase passes through the region where they are located.

- We have used spFRET to demonstrate fast, long-range, reversible conformational fluctuations in nucleosomes between two states: fully folded (closed) with the DNA wrapped around the histone core, and open, with the DNA significantly unraveled from the histone octamer (Tomschik et al., 2005), implying that most of the DNA on the nucleosome can be sporadically accessible to regulatory proteins and proteins that track the DNA double helix.

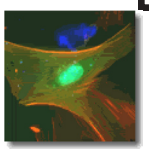
- In collaboration with Saleem Khan (Molecular Genetics and Biochemistry), we have used spFRET to demonstrate that PcrA DNA helicase displaces RecA from both ssDNA as well as dsDNA (Anand et al., 2007), as a model for regulation of homologous recombination.

- In collaboration with Pedro Rodriguez-Collazo (Cell Biology and Physiology), we have developed a method to isolate in one-step histones containing their native post-translational modifications (Rodriguez-Collazo et al., 2009). This method has also been patented and licensed.

Our future goals are to build combination single-molecule instruments to image and manipulate intramolecular nanometer movements in submillisecond real-time with piconewton force sensitivity (e.g., we want to observe directly what happens to the histones in a nucleosome in the path of a transcribing polymerase). We want to observe what changes in superhelicity occur upon nucleosome formation, nucleosome by nucleosome. We hope to resolve whether the positive supercoils generated by a transcribing polymerase are sufficient to displace histone octamers. In addition to chromatin, we are studying the mechanism of action of individual helicases unwinding DNA. We are also working on the capability to observe in real time single nucleosome dynamics in living cells.

Sandra A. Murray, Ph.D.
Professor

In Dr. Murray's laboratory integrated approaches are being used in studies to assess the role of gap junctions and cell-to-cell communication in endocrine cell proliferation, migration, differentiation, and hormone production and to elucidation of factors regulating gap junction plaque assembly and degradation. Four different techniques (time-lapse video microscopy, immunocytochemistry, transmission electron microscopy, and western blot analysis) are being used to examine gap junction protein (connexin) trafficking, assembly into gap junction plaques at the cell membrane and subsequent degradation. The effect of over expression and inhibition of gap junctions on adrenal cell function, are being studied with vectors containing cDNA antisense, dominant-negative constructs, siRNA approaches, and antibody directed against gap junction



genes products. Together these studies are designed to elucidate the role connexin gap junction channels and cell-cell communication in regulating cell population response to physiological stimuli and to demonstrate the molecular machinery involved in gap junction protein trafficking and degradation.

Kathryn W. Peters, Ph.D.
Research Assistant Professor

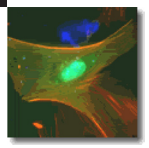
The cystic fibrosis transmembrane conductance regulator (CFTR) is a cAMP/PKA-regulated chloride channel; its phosphorylation controls both channel gating and trafficking at the plasma membrane. We are evaluating the distribution of CFTR and SNARE proteins in airway epithelial cells to determine their role in the trafficking process. Our data suggest that CFTR resides in lipid microdomains and that the cAMP-induced increase in apical membrane CFTR density involves regulation of CFTR trafficking to these domains through physical interactions with syntaxin 4. The presence of CFTR in lipid microdomains and increased amounts of CFTR in the plasma membrane after stimulation, suggest that CFTR is involved in trafficking in the human airway cell line, Calu-3.

Pedro Rodriguez-Collazo
Research Assistant Professor

The nucleosome fold is the basic structural and functional unit of the chromatin (the complex between DNA, proteins and RNA) and consists of approximately 180 base pairs of DNA wrapped around an octameric complex of core histones 2(H2A, H2B, H3, H4) and a linker histone (H1). The DNA array encodes the primary structure of the proteins, and at the same time a variety of proteins, for instance the histones, in turn, regulate the DNA-template processes thru a variety of mechanisms, which do not change the genetic code. Such inheritable changes in gene function (and expression) that do not involve changes in the DNA nucleotide sequence are commonly known as “epigenetic”. The combination of covalent histone modifications might generate a sort of “histone code” through which the cell could sensor its external and internal environmental status (‘environmental sensor’). We study how changes in histone modification in response to a variety of stimulus direct the DNA-template processes. We developed for these studies easy, innovative and sensitive methods for extracting and isolation the histones from intact undisturbed cells, in one single step without affecting their original patters of modifications (Reference 1). In addition, we are using variety of techniques and approaches, ranging from cell biology to biochemistry analysis to get insights on the relationship between chromatin structure and function.

Kathleen D. Ryan, Ph.D.
Associate Professor

Dr. Ryan’s primary role is Associate Director of the Office of Medical Education in the School of Medicine.



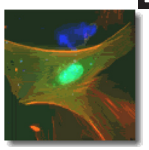
Guy Salama, Ph.D.
Professor

A central goal of Dr. Salama's laboratory is to elucidate the mechanisms responsible for the initiation and termination of cardiac arrhythmias. An important step towards that end is to better understand the electrophysiology and function of the normal mammalian heart. To achieve these goals, new optical systems were developed to simultaneously map membrane potential (Vm) intracellular free calcium (Cai) at high spatila and temporal resolution using voltage-sensitive dyes and indicators of Cai. Map of action potential (AP) propagation and repolarization are used to elucidate the mechanisms that generate spatial heterogeneities of AP durations and the interplay between dispersion of repolarization (DOR) and anisotropic conduction velocities (CV). Several parameters play a role in producing non-uniformities of repolarization: the anisotropy of fiber structure is now found to influence DOR as well as CV and spatial heterogeneities of ionic channel expression and of AP duration restitution following a change in heart rate. Another related issue is to map AP propagation transmurally from endocardium to epicardium in 3-dimensions to elucidate the role of M-cells as (midwall cells) and of the specialized conduction system (i.e. Purkinje fibers) which may provide reentry pathways by forming a barrier of abrupt DOR. Animal models for cardiac arrhythmias include: acute ischemia in the guinea pig heart and rabbit models of the long QT syndrome (LQTS) and sex-related differences in ion channel expression. A number of mechanisms are being investigated as factors that promote arrhythmias in the LQTS: elevation of extracellular K+, sympathetic stimulation, and the role of spontaneous Ca2+ oscillation from the sarcoplasmic reticulum. Mapping spatial heterogeneities of Cai transients in mammalian hearts to determine the normal heterogeneities of Cai transients, in a wide range of physiological conditions to determined parameter that modulate Cai transients. This laboratory has also been at the forefront of investigations on the role of sulfhydryl oxidation-reduction as a mechanism to regulate Ca2+ release from the sarcoplasmic reticulum (SR). This line of work is proceeding in very exciting directions. 1) We have found that nitric oxide (NO) and NO donors nitrosylate regulatory thiols on the SR Ca2+ release channel (e.g., ryanodine receptor) resulting in channel opening and release of Ca2+ from the SR. This mechanism seems to play a key role in Ca2+ homeostasis in striated muscles. 2) We recently found that the actions of NO can be reversed by thioredoxin, thioredoxin reductase, a thiol redox regulatory mechanism in mammalian cells which is linked to NAPDH metabolism.

Bela Schmidt, Ph.D.
Research Assistant Professor

My primary interests are the various proteins involved in the biogenesis and trafficking of CFTR molecules. One such example is the cysteine string protein (Csp) that seems to exert a specific block on the biogenesis of CFTR molecules, arresting them in the endoplasmic reticulum. Interestingly, Csp also turned out to play a role in the proteasomal degradation of CFTR.

More recently, I have been focusing on the role sumoylation plays in CFTR biogenesis. Certain de-sumoylation enzymes markedly increase the intracellular level of the disease-causing ΔF508 CFTR mutant, whereas they do not affect the level of wild type CFTR. Currently, I am investigating whether these desumoylating enzymes have therapeutical value for patients with cystic fibrosis.



Donna Beer Stolz, Ph.D.
Associate Professor
Assistant Director of Center for Biologic Imaging

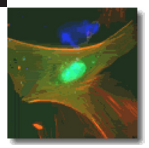
Overview: Angiogenesis is the process whereby new blood vessels sprout from existing vessels and requires that the specialized resident cells lining the vasculature, the endothelial cells (ECs), proliferate, migrate and differentiate spatially and temporally in response to specific signals. Vasculogenesis, on the other hand, has only recently emerged as an alternative mechanism of blood vessel growth in adult tissues and is the result of homing and engraftment of circulating EC precursors (ECPs) of bone marrow origin to sites of neovascularization. Both events are known to occur within the liver vasculature under very different conditions of growth, injury and repair, but the extent of each and the mechanisms by which they occur for each case is completely unknown. We evaluate various signaling events that accompany blood vessel growth and repair during liver regeneration following partial hepatectomy, the result of cold ischemia/warm reperfusion injury following liver transplantation or warm ischemia/warm reperfusion following surgical resections for cancer. Comparative analysis of these systems will elucidate both similar and dissimilar mechanisms that control these events and potentially lead to optimization of therapies that will reflect the specific requirements for injury based neovascularization in the liver.
Specific Projects: Compared to other organs, the liver is relatively hypoxic. We have shown that non-neoplastic hepatocytes do not respond through hypoxia Inducible factor-1 (Khan Z, Michalopoulos GK & Stolz DB, Peroxisomal localization of hypoxia-inducible factors and HIF regulatory hydroxylases in primary rat hepatocytes exposed to hypoxia-reoxygenation Am J Path 126(4):1251-1269. 2006), but still manage to upregulate expression of angiogenic factors like VEGF, PAI-1 and amphiregulin. How this occurs is unclear, but suggests alternative pathways to activate hypoxia-inducible angiogenic factors, which in the context of liver, will not mirror angiogenesis events in vascular beds with innately higher oxygen tensions.

Additional interests include novel subcellular localization patterns of specific signaling proteins such as peroxisomal iNOS, hypoxia inducible factor and its regulatory prolyl-hydroxylases in hepatocytes and other cell types.

Dr. Stolz is Assistant Director of the Center for Biologic Imaging and directs the electron microscopy facility of CBI.

Fei Sun, Ph.D.
Research Assistant Professor

Dr. Sun's research is focused on the regulation of protein processing in the endoplasmic reticulum (ER). His primary interest is to elucidate the mechanism(s) for CFTR folding and processing in the ER and to biochemically alter the processing. He is interested in the protein-protein interactions between CFTR and molecular chaperones, such as Hsp70, Hsc70 and Hdj2. His interest also lies in functional proteomics to study protein processing. Techniques used include: molecular biology, protein chemistry, electrophysiological techniques and adenoviral or peptide-mediated gene transfer.

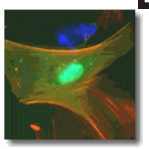


Patrick Thibodeau, Ph.D.
Assistant Professor

The primary research interests of my lab relate to the structure and function of ABC-transporter systems. ABC transporters play key roles in a large number of cellular processes by facilitating the translocation of a variety of substrates, ranging in size from single ions and small molecules to peptides and large proteins. Ongoing lab research focuses on ABC transporter structure and function, and how these structures are monitored and directed by cellular quality control machinery. The Pseudomonas aeruginosa Apr and Has protease-secreting ABC-transport systems are being used to probe the structural and mechanistic details associated with the translocation of large proteins implicated in the virulence of this, and other, human pathogens. Genetic and biochemical studies of these systems are directed towards understanding the recognition of substrate proteins and the mechanical details of their translocation. Second, recent work has led to the development of two assays, amenable to high throughput screening, which allow for the identification of cellular components that monitor and regulate the biosynthesis of mammalian ABC-transporter systems. Utilizing cytosolic domains from CFTR, we are currently working to identify the cellular machinery that facilitates the proper folding of wild-type CFTR and targets mutant forms of the protein for degradation. Finally, structural and biochemical studies of human ABC-transporters implicated in human disease (cystic fibrosis; cardiac calcification and pseudoxanthoma elasticum) are aimed at understanding defects associated with protein mutation and disease patho-physiology.

Linton M. Traub, Ph.D.
Associate Professor

Many molecules enter the cell interior within clathrin-coated vesicles, in process termed endocytosis. In the simplest sense, the clathrin-coated vesicle can be viewed as a nanomachine that temporally couples preferential retention of designated cargo with rapid vesicle assembly, invagination, and fission from the plasma membrane. In fact, this rapid process is critical to the way we move and think. At the tip of each axon, synaptic vesicles (packages of neurotransmitter) release their contents by fusing with the cell surface in response to stimulus-dependent calcium influx. Almost instantly, the membrane of the synaptic vesicle is then retrieved from the synapse within clathrin-coated vesicles. Clathrin-mediated endocytosis is thus tightly coupled to exocytosis, the stimulated release of neurotransmitter. Failure to recover synaptic-vesicle membrane results in both morphological disruption of the nerve terminal and defective neurotransmission. Clathrin-coated vesicles also play an important role in controlling plasma LDL-cholesetrol levels in humans and yolk protein accumulation in Drosophila and mosquitoes by promoting the rapid internalization of a family of related lipoprotein receptors. We study the mechanisms and molecules involved in clathrin-coat assembly. We are interested how this complex process, involving a network of more than 25 discrete protein components, is temporally coordinated to prevent chaotic seizures or run-away coat assembly. We have found recently that some of these protein components display unexpected cargo sorting properties that expand the overall sorting repertoire of the forming clathrin-coated vesicle. To understand how these complex structures assemble within only a minute or two, we use biochemical, cell biological, structural and live-cell imaging approaches to unravel the protein–protein interactions that orchestrate the formation of this elaborate protein-sorting machine.



Yong Wan, Ph.D.
Associate Professor

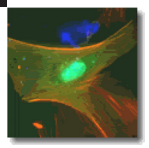
Research interests in my laboratory focus on the role of ubiquitin-dependent proteolysis in biological regulation. Currently, we are studying the control of cell cycle progression by proteolytic regulation. We are also interested in investigating the role of proteolysis in the regulation of the DNA damage-repair process, in the renewal and differentiation of stem cells, and in the pathogenesis of tumor formation. The long-term goal is to understand the biochemistry of these protein degradation pathways and to develop new intervention strategies based on an understanding of proteolytic regulation to combat cancer and treat other human disease. To achieve this, we plan to develop mutidisciplinary approaches, including biochemical and genetic analyses as well as chemical genetic techniques. We will apply these methods using several systems including functional proteomics, mammalian tissue culture cells and mouse model system.

Simon C. Watkins, Ph.D.
Professor, Vice Chairman of Department
Director of Center for Biologic Imaging

The application of advanced imaging tools to the field of immunology is constantly revealing new facets of cellular and molecular behaviour within the immune system. The goals of my research program are two fold. To develop novel quantitative fluorescent based assays using optical microscopy, and secondly to explore the basic cell biology of the Dendritic cell in health and disease. Recent accomplishments have been the demonstration that Dendritic cells are interconnected by a fine, reticulated network of tubules. These tubules not only allow functional connection between cells at great distance but may allow selective transmission of proteins between cells. At the moment we are exploring the various routes of molecular communication between dendritic cells, including tubes, microvesicles and cell contact to assess the potential of the mechanisms for antigen transfer amongst cells.

Allan Zhao, Ph.D.
Associate Professor

Obesity and type 2 diabetes have become serious health concerns in western societies. In the United States alone, approximately 25% of the population is obese; more than 60% are overweight. The American Diabetes Association estimates that currently there are about 16 million type 2-diabetic patients in the US. Our research interest is focused on the molecular signaling events underlying the actions of leptin and insulin, two very important hormones that regulate bodyweight, food-intake as well as glucose and fat metabolism. Recently, we have identified a novel mechanism that involves human C-reactive protein (CRP) as a circulating factor conferring leptin resistance in human obesity. Part of the research effort in the lab also aims to elucidate the causes underlying the linkage between obesity and certain types of cancer. Specifically, we are investigating the inhibitory effects of adiponectin, a hormone that is reduced in obesity, on the development and prognosis of endometrial cancer. The research work in my lab applies a wide range of tools, including biochemistry, molecular biology, and pharmacology. In addition, various kinds of spontaneous, transgenic, and gene-targeting animals models are used to mimic the situations in human obesity and type 2 diabetes.



Study Sections (Fiscal Year 2009-10)

Meir Aridor, Ph.D.
Associate Professor

ad hoc grant reviewer for National Science Foundation
ad hoc grant reviewer for Israel Science Foundation

Catherine Baty, Ph.D., D.V.M.
Research Assistant Professor

Reviewer, American College of Veterinary Internal Medicine

Michael B. Butterworth, Ph.D.
Assistant Professor

American Heart Association (AHA- Regional)
American Heart Association (National committee)
Medical Research Council (UK)

Daniel C. Devor, Ph.D.
Associate Professor

ad hoc reviewer for Cystic Fibrosis Foundation
ad hoc reviewer for Department of Veterans Affairs

Peter F. Drain, Ph.D.
Associate Professor

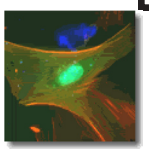
American Diabetes Association, National Grant Review Panel
NIH, Metabolism Study Section

Yang Hong, Ph.D.
Assistant Professor

FLY (Austin)

Vernon Gay, Ph.D.
Associate Professor

ad hoc Consultant, National Science Foundation



ad hoc Consultant, NICHD (Site Visits)

Guy Salama, Ph.D.
Professor

Reviewer for NSF, National AHA, Veterans Administration Research Program and Canadian Heart Association Grants
NIH-SBIR: July, 2009; February 22, 2010
NIH-PPG March 2, 2010

Alexander D. Sorkin, Ph.D.
Richard B. Mellon Professor and Chairman

NIH Neurodevelopment and neuroregeneration SC, June 2010 Ad Hoc
ASIRC (Italian Association for Cancer Research; standing member)

Donna Beer Stolz, Ph.D.
Associate Professor

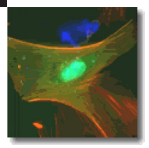
NIEHS Ad Hoc Reviewer Superfund Research Training Program. October 2009 (ZES1-LWJ-M (01)
NIDDK Ad hoc reviewer for Silvio Conti Digestive Diseases Centers ZDK1 March 2010 GRB-8-M1

Linton M. Traub, Ph.D.
Associate Professor

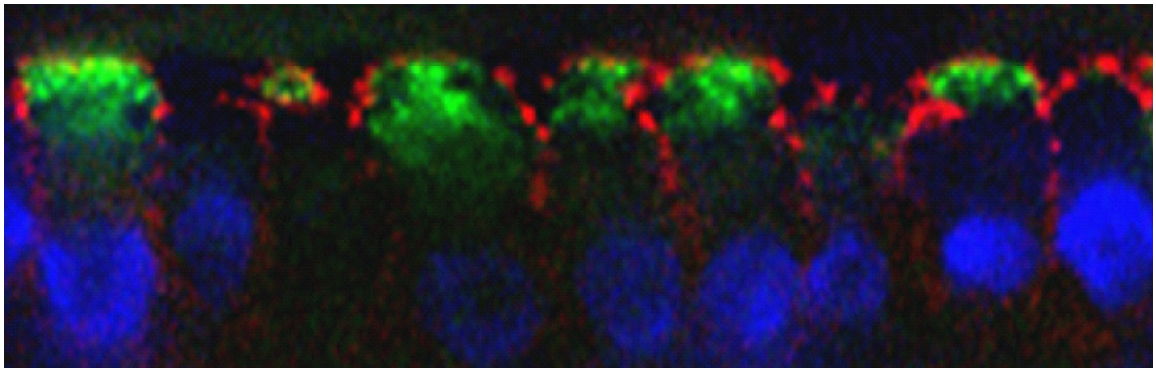
ad hoc member of NIH ZRG, CSF, and NRSA Study Section
American Heart Association Mid-Atlantic Consortium Study Section
Member - NIH *CSF* study section 2006-2010
ad hoc grant reviewer National Science Foundation
ad hoc grant reviewer Human Frontier Science Program
ad hoc grant reviewer The Wellcome Foundation
ad hoc grant reviewer Medical Research Council

Simon C. Watkins, Ph.D.
Professor and Vice Chairman, Director of Center of Biologic Imaging

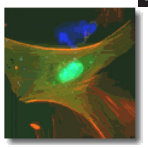
NIH Study Section 2009/10 ZRG1 CB-N (58) R Panelist 7/20-7/21 2009
NIH Study Section 2009/10 ZRG1 SBIB-V (58) R Panelist 7/20-7/21 2009



NIH Study Section 2009/10 ZRG1 IMST-F (30) S Shared Instrumentation Chair of Panel 07/22/2009-07/24/2009
NIH study Section National Primate Center, UC Davis, Sacramento Ca. Oct 21-23 2010
NIH Study Section, S10, Optical instrumentation November 12th 2009 (Chair of Panel)
NIH Study Section, High End Instrumentation November 13th 2009 (Chair of Panel)
ACS study section (Peer Review Committee on Clinical Cancer Research and Epidemiology) Atlanta GA Jan 27th-28th 2010
NIH Study Section ICMICS March 2nd-3rd 2010
Canadian Foundation for Innovation Study Section: Toronto Canada January March 17th 2010
LCME Committee Faculty University of Pittsburgh Medical School Self Study Committee May 2010
NIH study section, SBIRs, Washington DC June 30th 2010



Michael Butterworth. Co-immunofluorescent labeling of ENaC (green) and membrane (red) in primary human bronchiolar epithelial cells from a cystic fibrosis donor.



Faculty Advisory Committee Memberships (Fiscal Year 2009-2010)

Meir Aridor, Ph.D.
Associate Professor

University of Pittsburgh School of Medicine Interdisciplinary Biomedical Graduate Program- Cell Biology and Molecular Physiology Program Committee
Local Traffic Symposium; Organizing Committee Member
Cell Biology and Physiology Space Committee
Cell Biology and Physiology Faculty Recruitment Committee

Catherine Baty, Ph.D., D.V.M.
Research Assistant Professor

Committee Member for Health Sciences Course in Scientific Management and Leadership

Daniel Devor, Ph.D.
Associate Professor

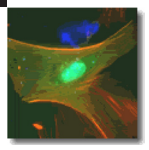
Cell Biology and Physiology Departmental Tenure and Promotions Committee
Cell Biology and Physiology Faculty Recruitment Committee
Chair, Interdisciplinary Biomedical Graduate Program Recruiting Committee: 2010-2011
Vice-Chair, Interdisciplinary Biomedical Graduate Program Recruiting Committee: 2009-2010
Member, Interdisciplinary Biomedical Graduate Program Recruiting Committee: 2007-2009
Ad-hoc member, Interdisciplinary Biomedical Graduate Program Admissions Committee, 2010

Peter F. Drain, Ph.D.
Associate Professor

University of Pittsburgh School of Medicine Interdisciplinary Biomedical Graduate Program- Cell Biology and Molecular Physiology Program Committee
Cell Biology and Physiology Representative, Graduate Student Recruitment Committee
Scholarly Project Executive Committee Member

Georgia K. Duker, Ph.D.
Assistant Professor

Vice-President of the C. F. Reynolds History of Medicine Society of the University of Pittsburgh
Honor Council Hearing Board – School of Medicine
Promotions Committee
Retention Committee
Cell Physiology Course Design Committee
Co-director of Digestion & Nutrition Course, MSII



Cell & Tissue Physiology Course design committee
Digestion and Nutrition course design committee
Coordinator for Graduate Teaching Fellows in Histology for 1st & 2nd year medical school curriculum
Coordinator of the University Honors College (undergrad) from the Medical School

Raymond A. Frizzell, Ph.D.
Professor and Director, Cystic Fibrosis Research Center

Member of Research Advisory Committee for the Health Sciences at the University of Pittsburgh.

Vernon L. Gay, Ph.D.
Associate Professor

Institutional Review Board (IRB)
Institutional Animal Care and Use Committee (IACUC)

Sanford Leuba, Ph.D.
Assistant Professor

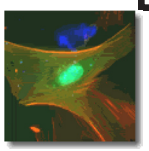
University Molecular Biophysics and Structural Biology Program Admissions Committee.

Sandra A. Murray, Ph.D.
Professor

Research Advisory Committee - Morehouse School of Medicine
Advisory Committee Child Health Research Center Grant
Member of the Training Faculty Immunology Graduate Training Program
University of Pittsburgh M.D./Ph.D. Selection Committee Member
University of Pittsburgh Commencement and Honors Convocation Speaker Selection
University of Pittsburgh Provost's Development Fund Advisory and Review Committee
Advisory Board Member for Survival Skills and Ethics Program
Postdoctoral Fellows Taskforce for School of Medicine
Cell Biology and Physiology Tenure and Promotions Committee
Co-Chairman of Session on Receptors and Signal Transduction, International Adrenal Conference
NIMH Training Grant Faculty Member - Advisory Committee

Kathleen D. Ryan, Ph.D.
Assistant Dean for Medical Education

Course Organizing Committee, Reproductive and Developmental Biology, University of Pittsburgh School of Medicine curriculum revision.



Chair, Institutional Animal Care and Use Committee, University of Pittsburgh
Promotions Committee, School of Medicine
Block Director, Basic Science Section, University of Pittsburgh, School of Medicine
Curriculum committee, University of Pittsburgh, School of Medicine
Retention committee (MS 1 & 2), University of Pittsburgh, School of Medicine
Retention committee (MS 2 & 3), University of Pittsburgh, School of Medicine

Guy Salama, Ph.D.
Professor

University of Pittsburgh School of Medicine Interdisciplinary Biomedical Graduate Program-Cell Biology and Molecular Physiology Program Committee

Alexander D. Sorkin, Ph.D.
Richard B. Mellon Professor and Chair

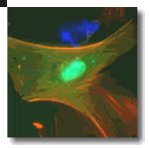
Cell Biology and Physiology Tenure and Promotions Committee
Cell Biology and Physiology Faculty Recruitment Committee

Donna Beer Stolz, Ph.D.
Associate Professor

University of Pittsburgh School of Medicine Interdisciplinary Biomedical Graduate Program-Cell Biology and Molecular Physiology Program Admissions Committee
Assistant Director - Cell Biology and Molecular Physiology Program
Interdisciplinary Biomedical Graduate Program Admissions Committee Tour Guide
Summer Undergraduate Research Program Director – Cell Biology and Physiology

Linton M. Traub, Ph.D.
Associate Professor

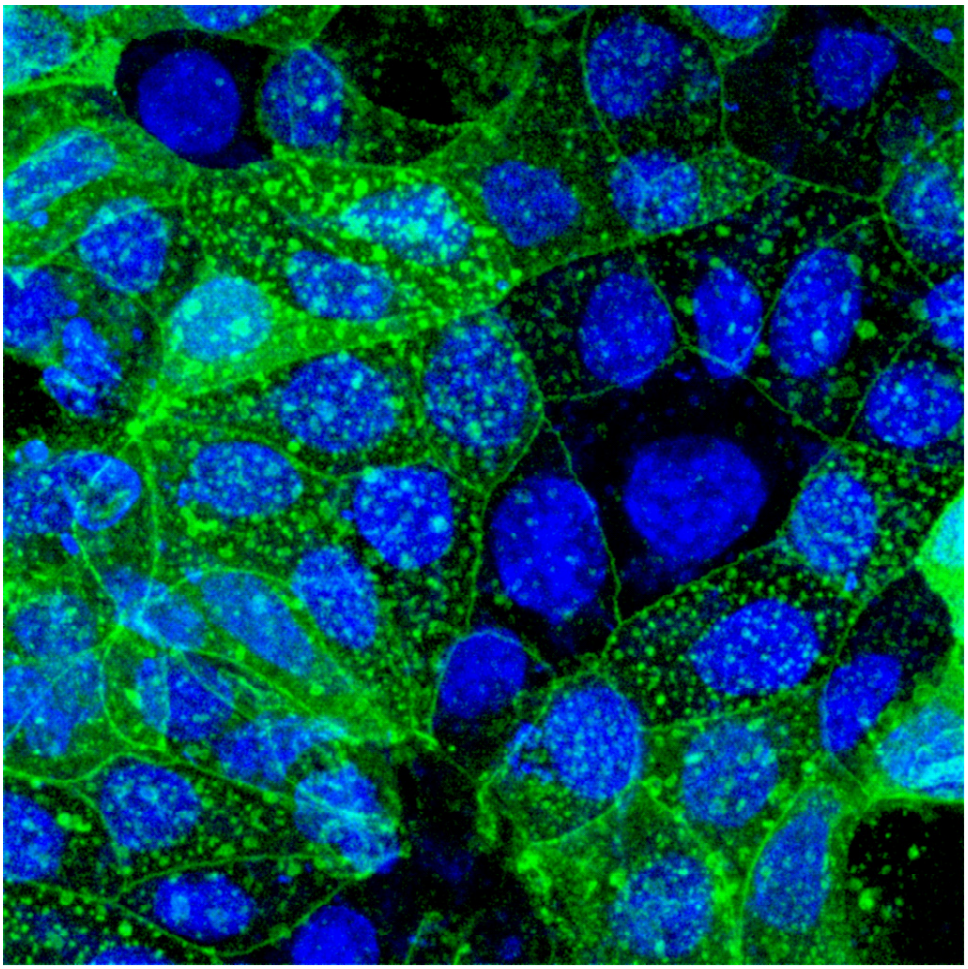
University of Pittsburgh School of Medicine Health Sciences Research Advisory Committee
University of Pittsburgh School of Medicine Doctoral Program in Molecular Biology (PIMB) Admissions and Recruitment Committee
Cell Biology and Physiology Tenure and Promotions Committee
Cell Biology and Physiology Faculty Recruitment Committee
Cell Biology and Physiology Space Committee
Planning Committee of Local Traffic Symposium on intracellular membrane traffic



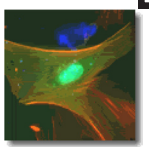
Simon C. Watkins, Ph.D.
Professor and Vice Chairman
Director of Center of Biologic Imaging

Cell Biology and Physiology Tenure and Promotions Committee
Cell Biology and Physiology Student Advisory Committee
Cell Biology and Physiology Space Committee
Cell Biology and Physiology Faculty Recruitment Committee
Graduate Program, Curriculum Committee

University of Pittsburgh School of Medicine, Research Advisory Committee
University of Pittsburgh Cancer Institute Core Resources Committee
University of Pittsburgh Tenure and Promotions Committee
Scientific Advisory Board, Starzl Transplant Institute
Intramural Bridging Fund Review Committee
Scientific Advisory Board: Roper Scientific
Member at Large, School of Medicine Executive Committee



Michael Butterworth. Labeling of lipid rafts in mouse kidney epithelial cells. ENaC is know to reside in rafts and these membrane structures are involved in the channel's regulation



Faculty Editorships (Fiscal Year 2009-2010)

Michael B. Butterworth, Ph.D.
Assistant Professor

American Journal of Physiology – Renal Physiology
Frontiers in Renal and Epithelial Physiology
World Journal of Biological Chemistry

Raymond A. Frizzell, Ph.D.
Professor and Director, Cystic Fibrosis Research Center

Member, Editorial Board, Journal of Biological Chemistry
Associate Editor, American Journal of Physiology
International Editorial Board, Gene Therapy

Vernon Gay, Ph.D.
Associate Professor

Member, Editorial Board, Endocrinology
Member, Editorial Board, Biology of Reproduction

Alexander D. Sorkin, Ph.D.
Richard B. Mellon Professor and Chair

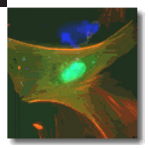
Molecular Biology of the Cell
Traffic
Current BioData Ltd

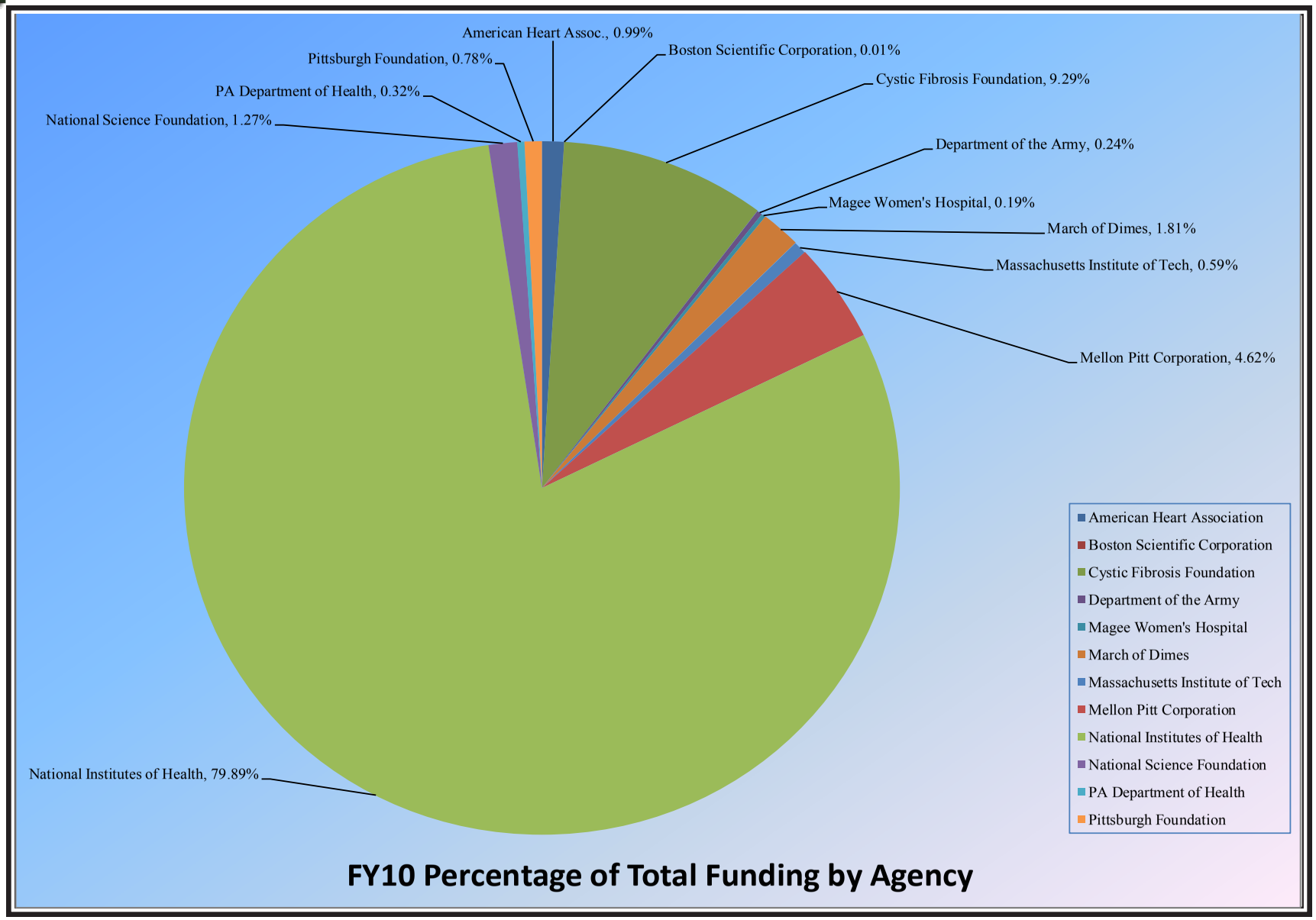
Linton Traub, Ph.D.
Associate Professor

Member, Editorial Board, Traffic
Member, Editorial Board, Cellular Logistics

Simon C. Watkins, Ph.D.
Professor and Vice Chairman, Director of Center of Biologic Imaging

Member, Editorial Board, PittMed
Associate Editor, Experimental Biology and Medicine
Editor, Current Protocols in Cytometry
Editor, Experimental Science and Medicine



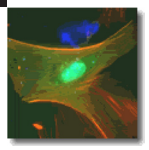

American Heart Assoc., 0.99%
Boston Scientific Corporation, 0.01%
Pittsburgh Foundation, 0.78%
Cystic Fibrosis Foundation, 9.29%
PA Department of Health, 0.32%
National Science Foundation, 1.27%
Department of the Army, 0.24%
Magee Women's Hospital, 0.19%
March of Dimes, 1.81%
Massachusetts Institute of Tech, 0.59%
Mellon Pitt Corporation, 4.62%
National Institutes of Health, 79.89%
American Heart Association
Boston Scientific Corporation
Cystic Fibrosis Foundation
Department of the Army
Magee Women's Hospital
March of Dimes
Massachusetts Institute of Tech
Mellon Pitt Corporation
National Institutes of Health
National Science Foundation
PA Department of Health
Pittsburgh Foundation
FY10 Percentage of Total Funding by Agency

STUDENTS INVOLVED IN RESEARCH IN CBP FACULTY LABS

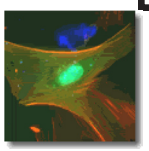
Snapshot as of June, 2010

GRADUATE STUDENTS ENROLLED IN CBMP PROGRAM

STUDENT	LAB	SUPPORT
Mark A. Bailey	Daniel Devor, Ph.D. Cell Biology & Physiology	Daniel Devor, Ph.D. Cell Biology & Physiology
Paula J. Bernal	Claudette St. Croix, Ph.D. Environmental/Occupational Health	Claudette St. Croix, Ph.D. Environmental/Occupational Health
Ethan Block	Jess Klarlund, Ph.D. Ophthalmology	Jess Klarlund, Ph.D. Ophthalmology
Cavita Chotoo	Dan Devor, Ph.D. Cell Biology & Physiology	Dan Devor, Ph.D. Cell Biology & Physiology
ShanShan Cui	Ora Weisz, Ph.D. Medicine/Renal	Ora Weisz, Ph.D. Medicine/Renal
Bado Hewa DeFranco	Sandra Murray, Ph.D. Cell Biology & Physiology	Sandra Murray, Ph.D. Cell Biology & Physiology
Elizabeth Delorme-Axford	Carolyn Coyne, Ph.D. MMG	Carolyn Coyne, Ph.D. MMG
Siobhan Gregg	Laura Niedernhofer, M.D., Ph.D. MMG	Laura Niedernhofer, M.D., Ph.D. MMG
Anupma Jha	Linton Traub, Ph.D. Cell Biology & Physiology	Linton Traub, Ph.D. Cell Biology & Physiology
Xinxian Qiao	Yong Wan, Ph.D. Cell Biology & Physiology	Yong Wan, Ph.D. Cell Biology & Physiology
Daniel Roh	James Funderburgh, Ph.D. Ophthalmology	James Funderburgh, Ph.D. Ophthalmology
Mark R. Silvis	Neil Bradbury, Ph.D./ Raymond Frizzell, Ph.D. Cell Biology & Physiology	Neil Bradbury, Ph.D./ Raymond Frizzell, Ph.D. Cell Biology & Physiology
Arvind Suresh	Jennifer Condon, Ph.D. OB/GYN	Jennifer Condon, Ph.D. OB/GYN



Christina Szalinski	Ora Weisz, Ph.D. Medicine/Renal	Ora Weisz, Ph.D. Medicine/Renal
James Thieman	Linton Traub, Ph.D. Cell Biology & Physiology	Linton Traub, Ph.D. Cell Biology & Physiology



Cell Biology and Physiology Training Grants
FY10 and FY11

The Department of Cell Biology and Physiology has secured individual post-doctoral fellow sponsorship for a number of our research personnel.

FY10 Projects

Devor lab: *Molecular Mechanisms of SK3 and IK1 Channel Endocytosis and Downstream Trafficking in Endothelial Cells* (American Heart Association)

Frizzell lab: *14-3-3 Proteins Participate in the Regulations of CFTR Biogenesis* (American Heart Association)

The combined funding for these post doctoral fellowship grants is $87,251 in FY10 (Total costs, annualized).

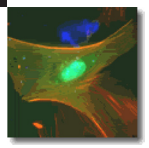
FY11 Projects

Frizzell lab: *14-3-3 Proteins Participate in the Regulations of CFTR Biogenesis* (American Heart Association)

The combined funding for these post doctoral fellowship grants is $36,319 in FY11 (Total costs, annualized).

Program Grant Training Program:
The Cystic Fibrosis Center funded Research Development Program (RDP) offer training funds to qualified post doctoral candidates, as follows:

FY10 Program Grant Training Funds - $70,000
FY11 Program Grant Training Funds - $70,000

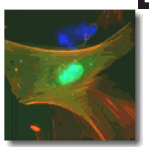


Cell Biology and Physiology Program Grants (Fiscal Year 2009-10)

The Department of Cell Biology and Physiology is funded for four Program Grants,three by the National Institutes of Health and one by the Cystic Fibrosis Foundation, as follows:

National Institutes of Health Cystic Fibrosis Research and Translation Core Centers Program (Principal Investigator/Program Director - Raymond A. Frizzell, Ph.D.):
(Abstract from the original application) A Cystic Fibrosis Research Center has existed at the University of Pittsburgh since 1997, although its structure and support mechanisms have, and continue to, change. The current center gathers over $9.6M in external grants and contracts in support of CF-related research. It consists of 39 investigators in 7 departments, whose research is focused in three major areas. The area of *Cell and Molecular Biology of CF*, directed at studies of CFTR in model systems and human airway cells, is led by Drs. Raymond Frizzell and Joseph Pilewski, and is supported largely through NIH R01 and Cystic Fibrosis Foundation (CFF) grants, as well as pharmaceutical industry contracts. This group studies mechanisms of CFTR biogenesis, trafficking and regulation, the role of CFTR in airway cell and pancreatic physiology, airway stem cells, and the epithelial sodium channel (ENaC), its regulation and its relation to the activity of CFTR. Therapeutic approaches evolving from several of these basic studies are being pursued as well. A second research area, *Lung Infection and Inflammation*, headed by Dr. Jay Kolls, focuses on the pulmonary inflammatory response to bacterial infection in human airway cell and animal models, defining the underlying mechanisms of these responses and how they can be modified therapeutically. This work is also supported primarily by NIH and CFF grants, and it represents a new and rapidly growing area within the Center. The third and also expanding area of focus is Clinical Research in CF, headed by Drs. Joseph Pilewski and David Orenstein. This group is pursuing several clinical studies that have emerged from the basic science initiatives of the Center, as well as projects within the Therapeutic Development Network (TDN) of the CFF; it is supported primarily by CFF grants at present. The proposed CF Research and Translation Core Center will be directed by Dr. Raymond Frizzell, who also directs the CFF-sponsored Research Development Program, a current NIH SCOR entitled 'CFTR in Airway Cell Function', is co-investigator on a T32-supported training program in epithelial cell biology, and participates in two other T32 training programs. Drs. Jay Kolls and Joseph Pilewski will serve as Associate Directors of the Center. The Center will be comprised of three cores other than the Administrative: Human Airway Cell Physiology (Raymond Frizzell and Joseph Pilewski, co-directors), Clinical Studies/ Outcomes (Jay Kolls and Joseph Pilewski, co-directors), and Imaging (Simon Watkins, director). In addition, the Core Center will operate a Pilot and Feasibility Program to encourage new ideas and investigators in CF research. Of past P/F projects within the NIH SCOR application, 100% have received NIH R01 grant support and all continue to be involved in CF research. This Center emphasizes the translation of basic knowledge into applied therapeutics. The projected funding period should witness the clinical testing of several novel strategies originating at the Center in CF patients.

This program grant totaled $871,998 (total costs) in FY10.



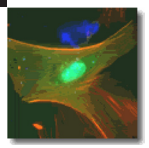
Cystic Fibrosis Center funded Research Development Program (Principal Investigator/ Program Director - Raymond A. Frizzell, Ph.D.):

(Abstract from the original application) A Cystic Fibrosis Foundation sponsored Research Development Program Center has existed at the University of Pittsburgh since 1997. The current center gathers over $9.6M in external grants and contracts in support of CF-related research. It consists of 40 investigators in seven departments, whose research is focused in three major areas. The area of *Cell and Molecular Biology of CF*, directed at studies of CFTR in model systems and human airway cells, is led by Drs. Raymond Frizzell and is supported largely through NIH R01 and Cystic Fibrosis Foundation (CFF) research grants, as well as pharmaceutical industry contracts. This group studies mechanisms of CFTR biogenesis, trafficking and regulation, the role of CFTR in airway cell and pancreatic physiology, airway stem cells, and the epithelial sodium channel (ENaC), its regulation and its relation to the activity of CFTR. Therapeutic approaches evolving from several of these basic studies are being pursued as well. A second research area, *Lung Infection and Inflammation*, headed by Dr. Jay Kolls, focuses on the pulmonary inflammatory response to bacterial infection in human airway cell and animal models, defining the underlying mechanisms of these responses and how they can be modified therapeutically. This work is also supported primarily by NIH and CFF grants, and it represents a new and rapidly growing area within the Center. The third and also expanding area of focus is Clinical Research in CF, headed by Dr. Joseph Pilewski. This group is pursuing several clinical studies that have emerged from the basic science initiatives of the Center, as well as projects within the Therapeutic Development Network (TDN) of the CFF; it is supported primarily by CFF grants at present. The proposed RDP renewal will be directed by Dr. Raymond Frizzell, who directs the current RDP, a current NIH SCOR entitled 'CFTR in Airway Cell Function', and a recently reviewed is co-investigator on a T32-supported training program in epithelial cell biology, and participates in two other T32 training programs. Drs. Jay Kolls and Joseph Pilewski will serve as Associate Directors of the Center. The Center will be comprised of three cores other than the Administrative: Human Airway Cell Physiology (Raymond Frizzell and Joseph Pilewski, co-directors), Clinical Studies/ Outcomes (Jay Kolls and Joseph Pilewski, co-directors), and Imaging (Simon Watkins, director). In addition, the Core Center will operate a Pilot and Feasibility Program to encourage new ideas and investigators in CF research. Of past P/F projects within the NIH SCOR application, 100% have received NIH R01 grant support and all continue to be involved in CF research. This Center emphasizes the translation of basic knowledge into applied therapeutics. The projected funding period should witness the clinical testing of several novel strategies originating at the Center in CF patients.

This program grant totaled $450,000 (total costs) in FY10. For more up to date information regarding the research conducted under this program grant, visit our website at: http://www.cbp.pitt.edu/centers/cfrc.html.

National Institutes of Health funded Specialized Cooperative Center in Reproduction Research (Principal Investigator - Tony M. Plant, Ph.D.):

(Abstract from the original application) The mission of the Specialized Cooperative Centers Program in Reproduction Research (SCCPRR) at the University of Pittsburgh School of Medicine continues to be the study of the physiology (integrative genomics) of the control systems that govern gonadal function in higher primates, including man. This mission of the Pittsburgh

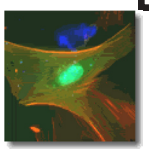


SCCPRR, which reflects the long-standing forte of this Center to employ nonhuman primate models to better understand human reproduction, is pursued by integrating molecular, cellular and system approaches. The Center will be comprised of two Technical Service Cores (Primate and Assay) with an open access format to subserve six SCCPRR projects (four in Pittsburgh), three projects at the Cooperative Reproductive Sciences Center at Morehouse School of Medicine, and several other programs supported by either R01 or R21 grants. Three of the four Pittsburgh SCCPRR projects focus on the development and control of the testis, with a particular emphasis on the regulation of proliferation and differentiation of stem spermatogonia (male germline stem cells, GSCs) and their niche providing somatic cells of Sertoli. Studies of premeiotic spermatogonia will be restricted to the human and monkey testis, and although the molecular biology underlying Sertoli cell proliferation and differentiation will be elucidated with nonprimate models, we aim to concomitantly translate findings in the rodent to the monkey. The fourth project will examine the control mechanisms that govern the early stages of follicular development using a nonhuman primate model. Both conceptual and methodological bridges link the four projects. In this regard, there are parallels in the paracrine control of follicular development, on the one hand, and the regulation of the male germinal epithelium, on the other. At the technical level, methodology developed at the Pittsburgh Center for controlling gene expression in granulosa cells will find direct application to the study of Sertoli cell biology in this proposal. The theme of the primate gonad is explored with vertical balance in investigator experience, and it is anticipated that this approach will guarantee that the Pittsburgh SCCPRR will continue to contribute significantly to our understanding of human reproduction and to the treatment of its disorders.

This program grant totaled $1,302,838 (total costs) in FY10 ($235,701 of this total cost is for a stimulus administrative supplement). For more up to date information regarding the research conducted under this program grant, visit our website at: http://www.crrp.pitt.edu.

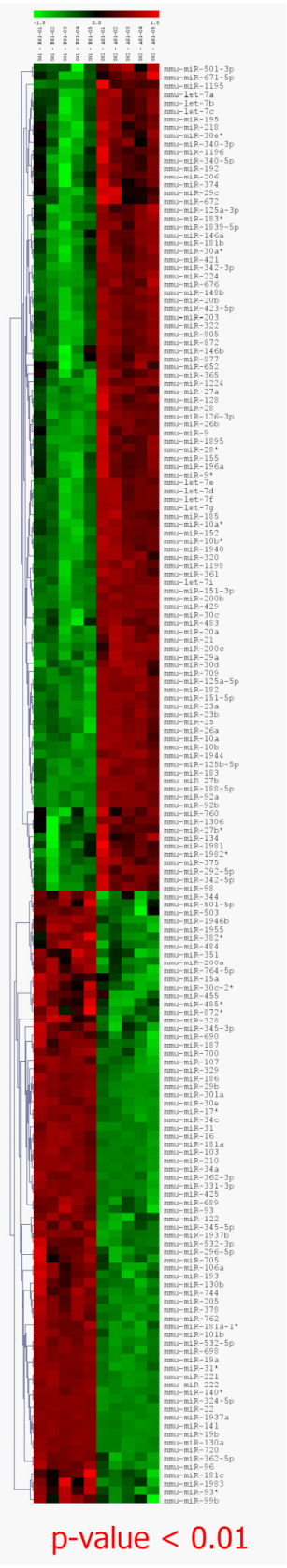
National Technology Centers for Networks and Pathways
(Principal Investigators –Simon Watkins, Ph.D.):

Over the last several years, microscopy as a scientific tool has reinvented itself. It has changed from a group of principally descriptive methodologies, to a wide range of quantitative tools and techniques to investigate the molecular organization of organs, tissues and cells. The University of Pittsburgh and Carnegie Mellon University (CMU) are homes to two of the leading imaging laboratories in the country; developing and applying novel fluorescent imaging tools to cutting edge biomedical research. At the Center for Biologic Imaging (CBI) of the University of Pittsburgh, we use commercially available and home built computer aided microscopic imaging tools to study these reporters within the context of living cells, tissues, and animals. The Molecular Biosensor and Imaging Center (MBIC) at CMU has a long history of developing and applying innovative microscopy and imaging technologies. The ultimate goal of this Center will be to act as a catalyst to strengthen and expand the impact of the new probe developments by providing facilities and expertise to test and validate the probes in the context of the driving biological projects and ultimately the research community at large. In addition, this Core will provide the facilities and broad scope of knowledge and experience required to combine cells, reagents, imaging technologies, software and informatics to create high quality, robust

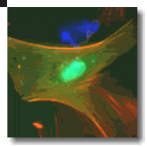


applications for cellular analysis. These applications will be validated in the laboratories of the context of the driving biological projects, and then made available to the research community as a whole.

This program grant totaled $444,371 (total costs) in FY10.



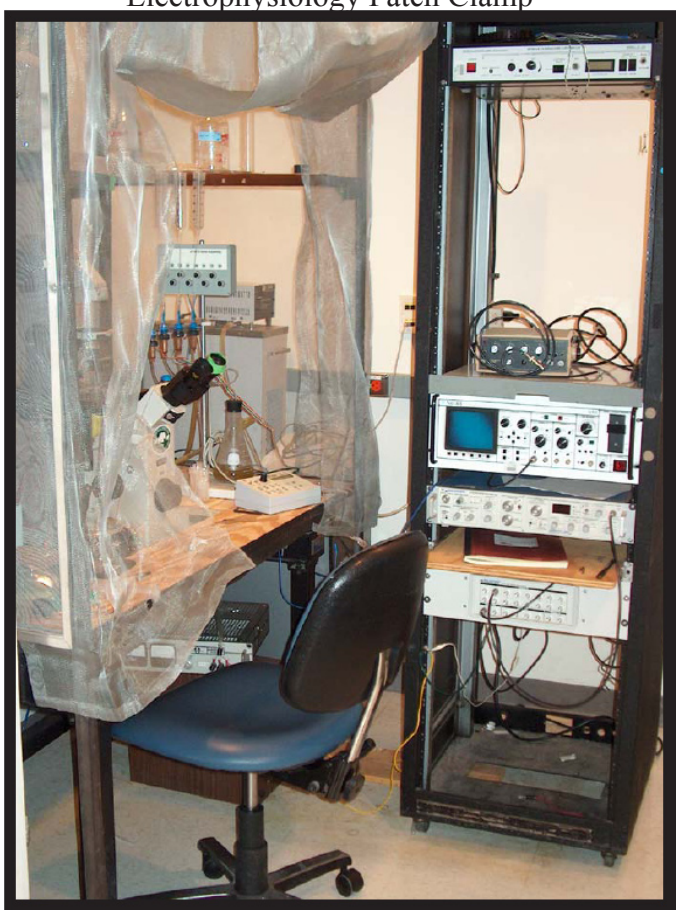
Michael Butterworth. "Heatmap" graph of up (green) and down (red) regulated miRNAs following steroid hormone treatment for all known mouse miRNAs (~950)

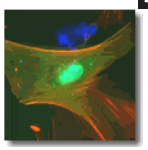


New CBP Research Recruits in FY10

Name	Rank	Lab Association
Faculty Level		
Paul J. Sammak	Visiting Associate Professor	
Alexander D. Sorkin	Chair & Professor	
Post Doctoral Level		
John Caltagarone	Post Doctoral Associate	Dr. Alexander Sorkin
Weijie Liu	Post Doctoral Associate	Dr. Yang Hong
Rita Papp	Post Doctoral Associate	Dr. Guy Salama

Electrophysiology Patch Clamp





Graduate Program in Cell Biology and Molecular Physiology

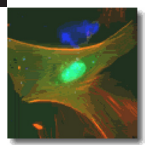
The program in Cell Biology and Molecular Physiology has a rich tradition of scientific training and discovery. Graduates of the Ph.D. program are now chairs of departments at six major U.S. medical schools. Today, the department brings together basic and clinical research faculty who are dedicated to their research programs and to the training of students. Among the medical school departments, this faculty is uniquely focused on integrative biology; that is, using the tools of genetics and molecular biology to understand the integrated functions of cells and organisms in the era following description of the human genome.

The educational component of the program offers students the opportunity to interact with multiple, well-supported faculty with international reputations. Stipends are provided for the students throughout their training. Students in the program enjoy a rich experience going far beyond formal classroom training, including numerous journal clubs, research conferences and the opportunity to attend national and international meetings.

The central theme of integrative biology in our program plays out in research projects that are focused on important diseases, including heart disease, cancer and diabetes, as well as inherited disorders of developmental and reproductive functions.

Genetic Disorders of Ion Channels
Inherited mutations in ion channels are responsible for many genetic diseases, including cystic fibrosis (CF). The department is home to a Specialized Center of Research in CF funded by the NIH (one of only two in the country) and the CF Foundation. Here, scientists are defining the factors that regulate ion channel activity and their expression on the plasma membrane. Inherited disorders of ion channels beyond CF include chronic obstructive pulmonary disease and hypertension. Program scientists are using biochemical, molecular expression, electrophysiologic, cell biologic and transgenic techniques to identify the channels involved in these processes and to define their regulation.
Focus group Faculty:
Dan Devor, Ph.D.
Ray Frizzell, Ph.D.
Patrick Thibodeau. Ph.D.
Kenneth Hallows, M.D., Ph.D. (Medicine, Renal)
Tom Kleyman, M.D. (Medicine, Renal)

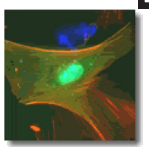
Molecular Basis of Cardiac Arrhythmias
Molecular engineering of ion channels and high-speed imaging are being used to study the electrophysiology of the heart with the goal of identifying the mechanisms responsible for the initiation and termination of cardiac arrhythmias.
Focus group Faculty:
Guy Salama, Ph.D.



Regulation of Gene Expression during Development
Identifying the factors that control gene expression is central to understanding how normal and malignant cell growth is regulated. Scientists in this program are identifying components of the gene transcription machinery that mediate signaling by steroid and peptide hormones, which control germ cell development and somatic cell differentiation. The regulation of gene expression is critical for many differentiated cell functions including fertility, hormone secretion, cell-cell communication and motor development. Members of this program are studying how alterations in these processes can lead to infertility, changes in wound healing, muscular dystrophy and cancer.
Focus group Faculty:
Pat Hebda, Ph.D. (Otolaryngology)
Yang Hong, Ph.D.
Nirmala Sundar-Raj, Ph.D. (Ophthalmology)
Donna Beer Stolz, Ph.D.
Shivalingappa Swamynathan Ph.D. (Ophthalmology)
Simon C. Watkins, Ph.D.

The Molecular Events Leading to Cancer
Areas of study include the regulation of chromatin structure that is essential for faithful function of the cell at the DNA level and the modifications of proteins that are required for the correct timing of cell division.
Focus group Faculty:
Sanford Leuba, Ph.D.
Laura J. Niedernhofer, M.D., Ph.D. (Microbiology and Molecular Genetics)
Yong Wan, Ph.D.

Membrane Traffic of Proteins and Lipids
Much of modern cell biology is focused on the mechanisms that target proteins and lipids to their proper cellular destinations. The controlled movement of membranes is critical for the actions of growth factors, the secretion of hormones and neurotransmitters, the processing of antigens during the immune response, the maintenance of cell polarity and many other vital cell functions. Scientists in this program are identifying the cellular compartments involved in these processes and the mechanisms that regulate membrane flow between them. Success in this venture leads to identification of the cell's sorting and targeting machinery, high-resolution structures of the proteins that mediate these processes and an understanding of how the physical interactions among these proteins are regulated.
Focus group Faculty:
Gerard Apodaca, Ph.D. (Medicine, Renal)
Meir Aridor, Ph.D.
Carolyn Coyne, Ph.D.
Tom Kleyman, M.D. (Medicine, Renal)
Sandra Murray, Ph.D.
David H. Perlmutter, M.D. (Pediatrics)

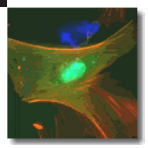


Linton Traub, Ph.D.
Ora Weisz, Ph.D. (Medicine, Renal)

Reproductive Biology
The neuroendocrine control of the hypothalamic-pituitary-gonadal axis is central to human sexual maturation and fertility. To better understand and replicate human reproductive processes, program members utilize rhesus monkeys as a model system. For this work, the Center for Research in Reproductive Physiology maintains a colony of 350 rhesus monkeys. Studies of these animals are conducted in tandem with investigation of human pathophysiology, and contemporary molecular and cell imaging techniques are applied to physiological paradigms to study signal transduction pathways, stress, puberty, spermatogenesis, fertility preservation, ovarian function, parturition, aging and endocrine disruptors.
Focus group Faculty:
Jennifer Condon, Ph.D.
Tony Plant, Ph.D.
William Walker, Ph.D.
Anthony Zeleznik, Ph.D.

Signal Transduction in Diabetes
Regulated secretion of insulin by the pancreas and the actions of insulin and leptin in muscle, fat and liver cells are critical for controlling the body's energy metabolism. Disruption of these processes leads to diabetes or obesity. Researchers in this program are defining the cell signaling mechanisms that control glucose-stimulated insulin secretion by pancreatic cells, and those that underlie the actions of insulin and leptin in the control of glucose and fat metabolism in peripheral tissues. By using cell models to identify the important response components, researchers are generating transgenic animal models to alter the expression of these signaling components to determine the mechanisms that lead to diabetes and obesity.
Focus group Faculty:
Peter Drain, Ph.D.
Abhiram Sahu, Ph.D.
David Whitcomb, M.D., Ph.D. (Medicine, Gastroenterology)
Allan Zhao, Ph.D.

Center for Biological Imaging
A state-of-the-art imaging center, which is actively involved in the development and application of all aspects of cutting edge microscopic imaging. Through this unique facility, advances in laser confocal microscopy, live cell multicolor fluorescence microscopy, electron microscopy and computer-assisted image processing have facilitated program research efforts and collaborations. Currently the center is developing new methods for imaging multiparallel data sets both in vitro and in vivo.
Director of CBI:
Simon Watkins, Ph.D.



Courses in the Cell Biology and Molecular Physiology Graduate Program

No New Courses in FY10

Course List July 2009 – June 2010

Title: MS Thesis Research
Course Number: 2800
Course Director: William Walker
When: Fall Term, Spring Term, Summer Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

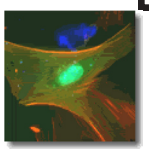
Description: A directed research project that results in a thesis for a Master's Degree.

Title: Cell and Molecular Physiology
Course Number: 2830
Course Director: Raymond Frizzell
When: Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference
Core Course for: Cell Biology and Molecular Physiology Program

Description: This course consists of lectures, problem-solving sessions, and examination of original papers. A main focus will be on the application of modern biophysical and molecular-genetic approaches in the analysis of cellular function. Topics include: 1) membrane transport; pumps, channels, and bio-electrical potentials; 2) excitable membranes; 3) regulation of ion channels; 4) absorptive and secretory functions of epithelia; 5) signal transduction; 6) molecular motors, cell motility, and muscle contraction.

Title: Regulation of Membrane Traffic
Course Number: 2840
Course Director: Gerard Apodaca/Ora Weisz
When: Summer Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences, INTBP 2005 Conference
Core Course for: students in the Program in Cell Biology and Molecular Physiology with research focus in cellular biology

Description: The focus of this course is to analyze membrane/protein traffic along both the biosynthetic and endocytic pathways. Particular emphasis will be placed on how this traffic is regulated and how it is disrupted during disease. The topics change each year and are tailored to the interests of the students. The topics this year include, the role of dynamin and dynamin-



associated proteins in receptor-mediated endocytosis, the function of Rab5 and its effector EEA1, regulation of traffic between early and late endosomes, quality control in the ER-associated degradation pathway, viral strategies for subversion of host cell defenses, regulation of trafficking of the TGN-associated proteinase furin, down-regulation of MHC class I by the HIV Nef protein, and transport between the secretory pathway and the cytosol.

Title: Research Seminar/Cell Biology Membrane Trafficking
Course Number: 2852
Course Director: Gerard Apodaca
When: Fall Term, Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences; INTBP 2005 Conference
Core Course for: students in the Program in Cell Biology and Molecular Physiology with research focus in cellular biology

Description: Advanced research seminar with journal club format specializing in current aspects of cell-cell communication, cell signaling, and membrane/protein traffic.

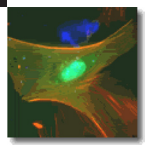
Title: Research Seminar/Reproductive Physiology
Course Number: 2853
Course Director: Tony Plant
When: Fall Term, Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: Advanced research seminar with journal club format specializing in current aspects of reproductive physiology.

Title: Research Seminar/Molecular Physiology
Course Number: 2855
Course Director: Thomas Kleyman
When: Fall Term, Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: Advanced Research Seminar with Journal Club format specializing in current aspects of molecular and cellular physiology.

Title: Research Seminar/Stem Cells
Course Number: 2856
Course Director: Susan D. Reynolds
When: Fall Term, Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference



Description: The Stem Cell Journal Club will focus on recent articles addressing mechanisms regulating proliferation and differentiation of adult tissue-specific stem cells, interaction of these cells with stem cell niches, and use of these cells for tissue regeneration. Each week, one student will be responsible for selection and distribution of a relevant paper, and preparation of a 15 minute overview of the field and central hypotheses. The paper will then be discussed in a round-robin fashion with other members of the journal club presenting data. Students will be graded according to the quality of their introductory presentation and their participation in the discussion.

Title: Multiparametric Microscopic Imaging
Course Number: 2860
Course Director: C laudette St. Croix/Donna Stolz
When: Summer Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

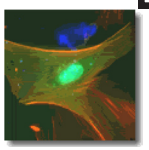
Description: 1) a lecture/lab course that immerses students in the theory and practical aspects of modern microscopic imaging. The fields will cover the theory and implementation of all types of light and electron microscopy and computer aided imaging. Students will be expected to reach a functional capability in a selected technology.

Title: Histology
Course Number: 2870
Course Director: Georgia Duker
When: Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: The objective of this lecture/lab course is to comprehend the relationship between structure and function at the cell, organ and organ system levels. Focus is placed on the integration of cell biology, classical histology and basic physiology of each of the organ systems, with the exclusion of the central nervous system. This knowledge is applied by building skills in the interpretation of light and electronmicrographic images of cells and organs. This course is a requirement for those graduate students wishing to serve as teaching fellows in Histology for the Medical School.

Title: Cell Biology of Normal & Disease States
Course Number: 2880
Course Director: Gerard Apodaca
When: Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference
Core Course for: Cell Biology and Molecular Physiology Program

Description: This course will extend basic knowledge of cell and molecular biology obtained



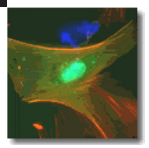
in Foundations of Biomedical science. The lectures will focus on four or five intensely active research areas of cell biology. Basic principles will be reinforced by considering disease states in which these processes are defective. Examples: cell growth and cancer, cell polarity and protein targeting, diseases of ion channels, cell biology of diabetes. Lectures and discussion groups.

Title: Directed Study
Course Number: 2890
Course Director: William Walker
When: Fall Term, Spring Term, Summer Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: This course provides the student an opportunity to carry out a specific laboratory project in any area of interest in Cell Biology or Physiology.

Title: Ph.D. Dissertation Research
Course Number: 3800
Course Director: William Walker
When: Fall Term, Spring Term, Summer Term
Prerequisites: Successful completion of the Comprehensive Examination
INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: After advancement to candidacy for the Ph.D. degree, students enroll in this course to pursue original experimental laboratory research. The results of which will provide the substance of their doctoral dissertation. A minimum of forty credits of this course are required for the Ph.D. degree in the School of Medicine.



Faculty Teaching Honors (Fiscal Year 2009-2010)

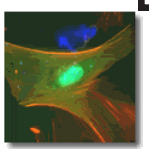
Georgia K. Duker, Ph.D.
Assistant Professor

Excellence in Education Award Presented by the Class of 2012 – Small Group Facilitator

Hooder, University of Pittsburgh Graduating Medical School Graduating Class of 2010

Student National Medical Association (SNMA) Open Door Award 2010

Michael Butterworth. Immunofluorescent labeling of early endosomal compartments (EEA1) in mouse kidney epithelial cells. ENaC traffics through these vesicles en route to recycling back to the membrane surface



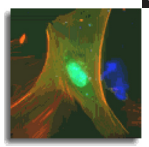
UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE
EDUCATIONAL CREDIT UNIT REPORT (AY 2008 – 2009)

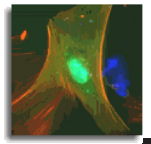
Department of Cell Biology and Physiology

	# ECUs	% ECUs
Department of Cell Biology and Physiology	**2621.7**	**15.4**
Combined Total for All Basic Science Departments	**17054**	**100**

Medical Student Instructional Activities

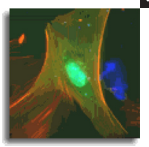
FAC LAST NAME	ACTIVITY TYPE	ACTIVITY TITLE	COURSE / CLERKSHIP TITLE	START DATE	END TIME	TIME	STUDENT LEVEL
Drain	Small Group	First SG session: Round table discussion of students	Methods and Logic in Medicine	09/17/08	8:30	10:00	MS-2
Drain	Small Group	SG Session Student presentations of SP proposals	Methods and Logic in Medicine	10/08/08	8:30	10:00	MS-2
Drain	Small Group	SG Session: Student presentations of SP proposals	Methods and Logic in Medicine	10/22/08	8:30	10:00	MS-2
Drain	Small Group	SG Session: Students presentations of SP proposals	Methods and Logic in Medicine	10/29/08	8:30	10:00	MS-2
Drain	Small Group	SG Session: Student presentations of SP proposals	Methods and Logic in Medicine	11/12/08	8:30	10:00	MS-2
Drain	Small Group	Students present PPT of responses to the critiques	Methods and Logic in Medicine	12/10/08	8:00	10:00	MS-2
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	01/21/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	02/04/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	02/18/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	03/04/09	8:30	10:00	MS-1
Drain	Lecture	Introduction to Part B	Methods and Logic in Medicine 1	03/25/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	04/08/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	04/15/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	04/29/09	8:30	10:00	MS-1
Drain	Small Group	Small Group Session	Methods and Logic in Medicine 1	05/13/09	8:30	10:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/08/08	9:00	12:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/08/08	13:00	16:00	MS-1





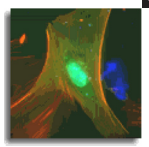
Duker	Small Group	Cell Biology	Prematriculation Program	07/09/08	9:00	12:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/09/08	13:00	16:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/10/08	9:00	12:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/10/08	13:00	16:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/11/08	9:00	12:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/11/08	13:00	16:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/14/08	9:00	12:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/14/08	13:00	16:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/15/08	9:00	12:00	MS-1
Duker	Small Group	Cell Biology	Prematriculation Program	07/15/08	13:00	16:00	MS-1
Duker	Small Group	Summer Reading Assignment	Introduction to Being a Physician	08/18/08	14:00	16:00	MS-1
Duker	Small Group	Cystic Fibrosis	Introduction to Being a Physician	08/19/08	10:00	11:00	MS-1
Duker	Small Group	Public Health	Introduction to Being a Physician	08/19/08	15:00	16:00	MS-1
Duker	Small Group	Public Health	Introduction to Being a Physician	08/20/08	14:30	16:00	MS-1
Duker	Small Group	HIV/AIDS	Introduction to Being a Physician	08/21/08	14:30	15:15	MS-1
Duker	Small Group	Breast Cancer	Introduction to Being a Physician	08/22/08	10:45	12:00	MS-1
Duker	Workshop	Physiology	Body Fluid Homeostasis - Cardio	08/29/08	8:00	9:20	MS-2
Duker	Workshop	Physiology	Body Fluid Homeostasis - Cardio	09/24/08	13:00	14:30	MS-2
Duker	Lecture	Lec. 1: Renal Anatomy and Histology	Body Fluid Homeostasis - Renal	09/30/08	8:30	9:45	MS-2
Duker	Laboratory	Lab 1: Anatomy and Histology	Body Fluid Homeostasis - Renal	09/30/08	10:00	12:00	MS-2
Duker	Laboratory	Lab 1: Introduction to Cell Structure	Cellular and Pathologic Basis of Disease	10/14/08	10:00	11:50	MS-1
Duker	Lecture	Lab Intro: Epithelial Diversity	Cellular and Pathologic Basis of Disease	10/15/08	14:00	14:30	MS-1
Duker	Laboratory	Lab 2: Epithelial Tissue	Cellular and Pathologic Basis of Disease	10/15/08	14:45	16:30	MS-1
Duker	Lecture	Lecture 8 and Lab Intro: Connective Tissue Cells	Cellular and Pathologic Basis of Disease	10/16/08	9:10	10:20	MS-1
Duker	Laboratory	Lab 3: Connective Tissue	Cellular and Pathologic Basis of Disease	10/16/08	10:30	12:00	MS-1
Duker	Workshop	Histology Workshop 1: Epithelial and Connective Tissue	Cellular and Pathologic Basis of Disease	10/17/08	9:00	10:30	MS-1
Duker	PBL	PBL Introduction	Cellular and Pathologic Basis of Disease	10/17/08	10:45	12:00	MS-1
Duker	Lecture	Lecture 9 and Lab Intro: Cartilage and Bone: Structure and Diversity	Cellular and Pathologic Basis of Disease	10/20/08	8:30	9:15	MS-1
Duker	Laboratory	Lab 4: Cartilage and Bone	Cellular and Pathologic Basis of Disease	10/20/08	9:25	10:50	MS-1
Duker	Laboratory	Pathology 2: Normal Histology of the Parenchyma, Airways, and Blood Vessels	Body Fluid Homeostasis - Pulmonary	10/21/08	8:30	9:20	MS-2
Duker	Laboratory	Lab Intro: Muscle Diversity	Cellular and Pathologic Basis of Disease	10/21/08	10:00	10:20	MS-1
Duker	Laboratory	Lab 5: Muscle Tissue	Cellular and Pathologic Basis of Disease	10/21/08	10:30	12:00	MS-1
Duker	Workshop	Histology Workshop 2:Cartilege an Bone Tissues	Cellular and Pathologic Basis of Disease	10/21/08	14:00	15:30	MS-1
Duker	Lecture	Lecture 16 and Lab Intro: Vascular Structure and Diversity	Cellular and Pathologic Basis of Disease	10/22/08	14:00	15:00	MS-1
Duker	Laboratory	Lab 6: Vascular Tissue	Cellular and Pathologic Basis of Disease	10/22/08	15:10	16:40	MS-1

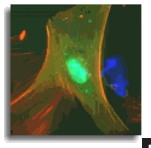
Duker	PBL	PBL Resolution	Cellular and Pathologic Basis of Disease	10/23/08	10:00	11:30	MS-1
Duker	Workshop	Histology Workshop 3: Muscle and Vascular Tissue	Cellular and Pathologic Basis of Disease	10/24/08	9:00	10:30	MS-1
Duker	PBL	Review	Cellular and Pathologic Basis of Disease	10/24/08	10:45	12:00	MS-1
Duker	Lecture	Lecture 21: Lipids and Membranes	Cellular and Pathologic Basis of Disease	10/28/08	8:30	9:20	MS-1
Duker	Lecture	Lecture 22: Membrane Transport	Cellular and Pathologic Basis of Disease	10/28/08	9:30	10:50	MS-1
Duker	Lecture	Lecture 27: Secretory Pathways I	Cellular and Pathologic Basis of Disease	10/29/08	13:00	13:50	MS-1
Duker	Lecture	Lecture 28: Secretory Pathways II	Cellular and Pathologic Basis of Disease	10/29/08	14:00	14:50	MS-1
Duker	Lecture	Lecture 29: Endocytosis	Cellular and Pathologic Basis of Disease	10/29/08	15:00	15:50	MS-1
Duker	Lecture	Review	Cellular and Pathologic Basis of Disease	10/31/08	10:00	11:50	MS-1
Duker	Exam	Exam 1	Cellular and Pathologic Basis of Disease	11/03/08	10:00	12:00	MS-1
Duker	Lecture	Introduction to Digestion & Nutrition	Digestion and Nutrition	11/10/08	8:00	8:20	MS-2
Duker	Lecture	Histology: Introduction to the Oral Cavity	Digestion and Nutrition	11/10/08	10:00	10:30	MS-2
Duker	Laboratory	Laboratory - Histology: Oral Cavity	Digestion and Nutrition	11/10/08	10:40	12:00	MS-2
Duker	Lecture	Lecture: Histology: Introduction to GI Tract: Esophagus & Stomach	Digestion and Nutrition	11/11/08	8:00	9:00	MS-2
Duker	Laboratory	Laboratory - Histology: Esophagus & Stomach	Digestion and Nutrition	11/11/08	9:10	10:30	MS-2
Duker	Lecture	Lecture: Histology: Small Bowel, Colon	Digestion and Nutrition	11/13/08	14:30	15:30	MS-2
Duker	Laboratory	Laboratory: Histology of small intestine & colon	Digestion and Nutrition	11/13/08	15:40	17:00	MS-2
Duker	Exam	Exam2	Cellular and Pathologic Basis of Disease	11/15/08	10:00	12:00	MS-1
Duker	Lecture	Lecture: Digestion & Absorption of Nutrients 2: Proteins	Digestion and Nutrition	12/01/08	8:50	9:40	MS-2
Duker	Lecture	Lecture: Digestion & Absorption of Nutrients 3: Lipids	Digestion and Nutrition	12/01/08	9:50	10:50	MS-2
Duker	Lecture	Lecture: Hollow Organ Histology Review Quiz	Digestion and Nutrition	12/04/08	10:00	10:40	MS-2
Duker	Exam	Exam: Digestion & Nutrition Exam 1, Hollow Organs	Digestion and Nutrition	12/05/08	9:00	12:00	MS-2
Duker	Lecture	Lecture: Histology: liver and biliary tract: Lab Intro	Digestion and Nutrition	12/08/08	9:10	9:30	MS-2
Duker	Laboratory	Lab:Histology: Liver, Pancreas, Gall bladder	Digestion and Nutrition	12/08/08	9:30	10:50	MS-2
Duker	Lecture	Lecture: Anatomy and histology of the pancreas	Digestion and Nutrition	12/12/08	10:00	10:50	MS-2
Duker	Lecture	Lecture: Review of histology	Digestion and Nutrition	12/18/08	9:00	9:30	MS-2
Duker	Exam	Exam: Solid organs exam	Digestion and Nutrition	12/19/08	9:00	12:00	MS-2
Duker	PBL	PBL-1	Fuel Metabolism	01/06/09	13:30	15:00	MS-1
Duker	Small Group	Small Group Conference	Fuel Metabolism	01/12/09	8:30	10:00	MS-1
Duker	PBL	PBL-2	Fuel Metabolism	01/13/09	9:45	11:15	MS-1
Duker	PBL	PBL-1 Introduction	Immunology in Health and Disease	01/21/09	14:00	16:00	MS-1
Duker	workshop	Workshop: Normal Endocrine Histology	Endocrine Disorders	01/23/09	10:00	12:00	MS-2
Duker	PBL	PBL I - Resolution	Immunology in Health and Disease	01/27/09	13:00	15:00	MS-1
Duker	PBL	PBL II - Introduction	Immunology in Health and Disease	01/28/09	14:00	16:00	MS-1
Duker	PBL	PBL II - Resolution	Immunology in Health and Disease	02/03/09	14:00	16:00	MS-1
Duker	PBL	PBL III - Introduction	Immunology in Health and Disease	02/04/09	14:00	16:00	MS-1



Duker	Laboratory	CPC 1-A: Basic Histology - Female	Reproductive & Developmental Biology	02/09/09	10:30	12:00	MS-2
Duker	Laboratory	CPC 1-B: Basic Histology - Male	Reproductive & Developmental Biology	02/12/09	10:30	12:00	MS-2
Duker	Lecture	Lecture 9: Placenta	Reproductive & Developmental Biology	02/13/09	11:00	12:00	MS-2
Duker	Small Group	Case 1: House of Cards - Session 1	Integrated Case Studies	03/02/09	9:00	10:00	MS-2
Duker	Small Group	Case 1: House of Cards - Session 2, Session 2 Subsequent A, Session 2 Subsequent B, Session 3	Integrated Case Studies	03/03/09	8:00	10:00	MS-2
Duker	Small Group	Case 1: Resolution Day	Integrated Case Studies	03/04/09	8:00	10:00	MS-2
Duker	Small Group	Case 5: Give this Patient a Hand - Session 1, Session 1 Subsequent A, Session 1 Subsequent B	Integrated Case Studies	03/16/09	8:00	10:00	MS-2
Duker	Small Group	Case 5: Give this Patient a Hand - Session 2, Session 2 Subsequent A, Session 2 Subsequent B	Integrated Case Studies	03/17/09	8:00	10:00	MS-2
Duker	Small Group	Case 5: Resolution Day	Integrated Case Studies	03/18/09	8:00	10:00	MS-2
Duker	Small Group	Case 8: All Pumped Up - All Sessions	Integrated Case Studies	03/26/09	8:00	10:00	MS-2
Duker	Small Group	Case 8: Resolution Day	Integrated Case Studies	03/27/09	8:00	10:00	MS-2
Duker	Laboratory	Neurons, Nerves, Synapses and Glia	Neuroscience	04/03/09	9:00	11:00	MS-1
Duker	PBL	PBL1: Introduction	Neuroscience	04/06/09	10:00	12:00	MS-1
Duker	PBL	PBL1: Resolution	Neuroscience	04/10/09	10:00	12:00	MS-1
Duker	PBL	PBL2: Introduction	Neuroscience	04/13/09	10:00	12:00	MS-1
Duker	PBL	PBL2: Resolution	Neuroscience	04/17/09	10:00	12:00	MS-1
Gay	Small Group	Diversity Workshop - Culture: Small Group	MS-1 Orientation - Class of 2012	08/13/08	14:30	15:30	MS-1
Gay	Small Group	Diversity Workshop - Sexual Orientation: Small Group	MS-1 Orientation - Class of 2012	08/14/08	14:45	15:45	MS-1
Gay	Small Group	Diversity Workshop - Gender: Small Group	MS-1 Orientation - Class of 2012	08/15/08	14:45	15:45	MS-1
Gay	Workshop	Physiology	Body Fluid Homeostasis - Cardio	08/29/08	8:00	9:20	MS-2
Gay	Workshop	Physiology	Body Fluid Homeostasis - Cardio	09/24/08	13:00	14:30	MS-2
Gay	PBL	PBL-1	Fuel Metabolism	01/06/09	13:30	15:00	MS-1
Gay	Small Group	Small Group Conference	Fuel Metabolism	01/12/09	8:30	10:00	MS-1
Gay	PBL	PBL-2	Fuel Metabolism	01/13/09	9:45	11:15	MS-1
Gay	Small Group	Case 4: Hot and Bothered - All Sessions	Integrated Case Studies	03/11/09	8:00	10:00	MS-2
Gay	Small Group	Case 4: Resolution Day	Integrated Case Studies	03/12/09	8:00	10:00	MS-2
Gay	Small Group	Case 5: Give this Patient a Hand - Session 1, Session 1 Subsequent A, Session 1 Subsequent B	Integrated Case Studies	03/16/09	8:00	10:00	MS-2
Gay	Small Group	Case 5: Give this Patient a Hand - Session 2, Session 2 Subsequent A, Session 2 Subsequent B	Integrated Case Studies	03/17/09	8:00	10:00	MS-2
Gay	Small Group	Case 5: Resolution Day	Integrated Case Studies	03/18/09	8:00	10:00	MS-2
Gay	Small Group	Case 6: Damsel in Distress - All Sessions	Integrated Case Studies	03/19/09	8:00	10:00	MS-2
Gay	Small Group	Case 6: Resolution Day	Integrated Case Studies	03/20/09	8:00	10:00	MS-2
Murray	Laboratory	Lab: Introduction to the Laboratory	Medical Anatomy	08/25/08	10:00	12:00	MS-1

Murray	Laboratory	Lab: Pectoral Region & Thoracic Wall	Medical Anatomy	08/26/08	10:00	12:00	MS-1
Murray	Laboratory	Lab: The Pectoral Region and Thoracic Wall	Medical Anatomy	08/26/08	15:00	17:00	MS-1
Murray	Laboratory	Laboratory: The Pleural Cavities	Medical Anatomy	08/27/08	15:00	17:00	MS-1
Murray	Laboratory	Laboratory: The Middle Mediastinum, Begin Superior and Posterior Mediastinum	Medical Anatomy	08/28/08	10:00	12:00	MS-1
Murray	Laboratory	Laboratory: Superior and Posterior Mediastinum	Medical Anatomy	08/29/08	10:00	12:00	MS-1
Murray	Lecture	Lecture: The Abdominal Wall (Murray)	Medical Anatomy	09/02/08	10:00	11:00	MS-1
Murray	Lecture	Lecture: The Inguinal Region (Murray)	Medical Anatomy	09/02/08	11:00	12:00	MS-1
Murray	Laboratory	Laboratory: Dissection of the Anterior Abdominal Wall	Medical Anatomy	09/02/08	14:30	17:00	MS-1
Murray	Laboratory	Laboratory: Complete Anterior Abdominal Wall, Peritoneum , Celiac Trunk and Foregut Organs	Medical Anatomy	09/03/08	14:00	17:00	MS-1
Murray	Laboratory	Laboratory: The Celiac Trunk & Foregut Organs, Superior and Inferior Mesenteric Arteries, Midgut and Hindgut Organs	Medical Anatomy	09/04/08	9:00	12:00	MS-1
Murray	Laboratory	Laboratory: Superior and Inferior Mesenteric Arteries	Medical Anatomy	09/05/08	11:00	12:00	MS-1
Murray	Laboratory	Laboratory: The Posterior Abdominal Wall	Medical Anatomy	09/08/08	9:00	12:00	MS-1
Murray	Laboratory	Laboratory: Introduction to the Pelvis and Pelvis Hemisection	Medical Anatomy	09/09/08	13:30	16:00	MS-1
Murray	Lecture	Lecture: The Perineum (Murray)	Medical Anatomy	09/10/08	13:00	14:00	MS-1
Murray	Laboratory	Laboratory: Dissection of the Pelvis	Medical Anatomy	09/10/08	14:00	16:00	MS-1
Murray	Laboratory	Laboratory: Dissection of the Pelvis	Medical Anatomy	09/11/08	9:00	12:00	MS-1
Murray	Small Group	Demonstrations (Perineum)	Medical Anatomy	09/12/08	10:00	12:00	MS-1
Murray	Exam	Exam I: Thorax, Abdomen, Pelvis, and Perineum	Medical Anatomy	09/15/08	9:00	12:00	MS-1
Murray	Small Group	Demonstrations - The Pterygopalatine Fossa	Medical Anatomy	09/19/08	10:00	12:00	MS-1
Ryan	Lecture	Basic Science Core Courses	MS-1 Orientation - Class of 2012	08/15/08	10:30	11:30	MS-1
Ryan	Small Group	Summer Reading Assignment	Introduction to Being a Physician	08/18/08	14:00	16:00	MS-1
Ryan	Small Group	Cystic Fibrosis	Introduction to Being a Physician	08/19/08	10:00	11:00	MS-1
Ryan	Lecture	Second Year Issues	MS-2 Class 0f 2011 Orientation	08/19/08	12:00	13:00	MS-2
Ryan	Small Group	Public Health	Introduction to Being a Physician	08/19/08	15:00	16:00	MS-1
Ryan	Small Group	Public Health	Introduction to Being a Physician	08/20/08	14:30	16:00	MS-1
Ryan	Small Group	HIV/AIDS	Introduction to Being a Physician	08/21/08	14:30	15:15	MS-1
Ryan	Small Group	Breast Cancer	Introduction to Being a Physician	08/22/08	10:45	12:00	MS-1
Ryan	Workshop	Physiology	Body Fluid Homeostasis - Cardio	08/29/08	8:00	9:20	MS-2
Ryan	Workshop	Physiology	Body Fluid Homeostasis - Cardio	09/24/08	13:00	14:30	MS-2
Ryan	PBL	PBL Introduction	Cellular and Pathologic Basis of Disease	10/17/08	10:45	12:00	MS-1
Ryan	Lecture	Lecture 14: Smooth Muscle I: Physiology	Cellular and Pathologic Basis of Disease	10/21/08	15:45	16:45	MS-1
Ryan	Lecture	Lecture 15: Smooth Muscle II: Regulation	Cellular and Pathologic Basis of Disease	10/22/08	13:00	13:50	MS-1
Ryan	PBL	PBL Resolution	Cellular and Pathologic Basis of Disease	10/23/08	10:00	11:30	MS-1
Ryan	Lecture	Lecture: Malabsorption, Maldigestion	Digestion and Nutrition	12/03/08	13:00	13:50	MS-2





Ryan	Exam	Exam: Solid organs exam	Digestion and Nutrition	12/19/08	9:00	10:00	MS-2
Ryan	Small Group	CPC 2: Menstrual Cycle (Elishaev and Core Facilitators)	Reproductive & Developmental Biology	02/10/09	8:30	10:20	MS-2
Ryan	PBL	PBL 1: Initial Session - Menstrual cycle and Physiology and Endocrinology	Reproductive & Developmental Biology	02/10/09	10:30	12:00	MS-2
Ryan	PBL	PBL 1: Resolution ; PBL 2 Introduction	Reproductive & Developmental Biology	02/16/09	8:30	10:00	MS-2
Ryan	Workshop	Workshop 1: Androgens (Core Facilitators)	Reproductive & Developmental Biology	02/16/09	10:15	11:00	MS-2
Ryan	Workshop	Workshop 2: Infertility (Core Facilitators)	Reproductive & Developmental Biology	02/16/09	11:00	12:00	MS-2
Ryan	Lecture	Lecture 18: Breast and Lactation (Ryan/Bogen)	Reproductive & Developmental Biology	02/19/09	10:40	11:30	MS-2
Ryan	Workshop	Workshop 3: Contraception	Reproductive & Developmental Biology	02/20/09	8:00	9:00	MS-2
Ryan	PBL	PBL 2: Resolution; PBL3: Introduction	Reproductive & Developmental Biology	02/20/09	9:00	11:15	MS-2
Ryan	Lecture	Lecture 22: Endocrinology of Sexual Maturation (Ryan)	Reproductive & Developmental Biology	02/24/09	8:00	9:00	MS-2
Ryan	Workshop	Workshop 4: Abnormalities of Early Development	Reproductive & Developmental Biology	02/24/09	9:15	10:30	MS-2
Ryan	PBL	PBL 3: Resolution	Reproductive & Developmental Biology	02/24/09	10:30	12:00	MS-2
Ryan	Lecture	Lecture 24: Menopause and Aging in the Female	Reproductive & Developmental Biology	02/26/09	8:40	9:20	MS-2
Ryan	Small Group	Case 1: House of Cards - Session 1	Integrated Case Studies	03/02/09	9:00	10:00	MS-2
Ryan	Small Group	Case 1: House of Cards - Session 2, Session 2 Subsequent A, Session 2 Subsequent B, Session 3	Integrated Case Studies	03/03/09	8:00	10:00	MS-2
Ryan	Small Group	Case 1: Resolution Day	Integrated Case Studies	03/04/09	8:00	10:00	MS-2
Ryan	Small Group	Case 2: SOB Story - Session 1 & Session 2	Integrated Case Studies	03/05/09	8:00	10:00	MS-2
Ryan	Small Group	Case 2: Resolution Day	Integrated Case Studies	03/06/09	8:00	10:00	MS-2
Ryan	Small Group	Case 8: All Pumped Up - All Sessions	Integrated Case Studies	03/26/09	8:00	10:00	MS-2
Ryan	Small Group	Case 8: Resolution Day	Integrated Case Studies	03/27/09	8:00	10:00	MS-2
Ryan	Workshop	Pandemic Exercise - Hospital	Preclerkship	05/06/09	8:45	11:30	MS-3
Ryan	Workshop	Pandemic Exercise - Hospital	Preclerkship	05/06/09	14:15	17:00	MS-3
Sahu	PBL	PBL Introduction	Cellular and Pathologic Basis of Disease	10/17/08	10:45	12:00	MS-1
Sahu	PBL	PBL Resolution	Cellular and Pathologic Basis of Disease	10/23/08	10:00	11:30	MS-1
Salama	Lecture	Electrical activity 1	Body Fluid Homeostasis - Cardio	08/24/08	10:40	11:40	MS-2
Salama	Lecture	Electrical activity 2	Body Fluid Homeostasis - Cardio	08/25/08	9:40	10:30	MS-2
Salama	Lecture	Electrical activity 3	Body Fluid Homeostasis - Cardio	08/25/08	10:50	11:40	MS-2
Stolz	Laboratory	Lab 1: Introduction to Cell Structure	Cellular and Pathologic Basis of Disease	10/14/08	10:00	11:50	MS-1
Stolz	Laboratory	Lab 2: Epithelial Tissue	Cellular and Pathologic Basis of Disease	10/15/08	14:45	16:30	MS-1
Stolz	Laboratory	Lab 3: Connective Tissue	Cellular and Pathologic Basis of Disease	10/16/08	10:30	12:00	MS-1
Stolz	Workshop	Histology Workshop 1: Epithelial and Connective Tissue	Cellular and Pathologic Basis of Disease	10/17/08	9:00	10:30	MS-1
Stolz	PBL	PBL Introduction	Cellular and Pathologic Basis of Disease	10/17/08	10:45	12:00	MS-1
Stolz	Laboratory	Lab 4: Cartilage and Bone	Cellular and Pathologic Basis of Disease	10/20/08	9:25	10:50	MS-1
Stolz	Laboratory	Lab 5: Muscle Tissue	Cellular and Pathologic Basis of Disease	10/21/08	10:30	12:00	MS-1
Stolz	Workshop	Histology Workshop 2:Cartilege an Bone Tissues	Cellular and Pathologic Basis of Disease	10/21/08	14:00	15:30	MS-1

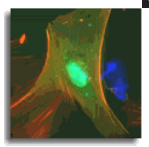
Stolz	Laboratory	Lab 6: Vascular Tissue	Cellular and Pathologic Basis of Disease	10/22/08	15:10	16:40	MS-1
Stolz	Lecture	Lecture 17: Vasculogenesis & Angiogenesis	Cellular and Pathologic Basis of Disease	10/23/08	9:00	9:50	MS-1
Stolz	PBL	PBL Resolution	Cellular and Pathologic Basis of Disease	10/23/08	10:00	11:30	MS-1
Stolz	Workshop	Histology Workshop 3: Muscle and Vascular Tissue	Cellular and Pathologic Basis of Disease	10/24/08	9:00	10:30	MS-1
Stolz	Laboratory	Laboratory - Histology: Oral Cavity	Digestion and Nutrition	11/10/08	10:40	12:00	MS-2
Stolz	Laboratory	Laboratory - Histology: Esophagus & Stomach	Digestion and Nutrition	11/11/08	9:10	10:30	MS-2
Stolz	Laboratory	Laboratory: Histology of small intestine & colon	Digestion and Nutrition	11/13/08	15:40	17:00	MS-2
Stolz	Laboratory	Lab:Histology: Liver, Pancreas, Gall bladder	Digestion and Nutrition	12/08/08	9:30	10:50	MS-2
Walker	PBL	PBL-1	Fuel Metabolism	01/06/09	13:30	15:00	MS-1
Walker	Small Group	Small Group Conference	Fuel Metabolism	01/12/09	8:30	10:00	MS-1
Walker	PBL	PBL-2	Fuel Metabolism	01/13/09	9:45	11:15	MS-1
Watkins	Lecture	Lectures 3 & 4: Cytoskeleton I & II	Cellular and Pathologic Basis of Disease	10/14/08	13:00	14:50	MS-1
Watkins	PBL	PBL Introduction	Cellular and Pathologic Basis of Disease	10/17/08	10:45	12:00	MS-1
Watkins	PBL	PBL Resolution	Cellular and Pathologic Basis of Disease	10/23/08	10:00	11:30	MS-1

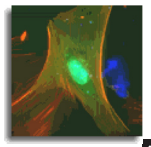
Medical Student Course Administrative Activities

FAC LAST NAME	ACTIVITY TYPE	COURSE / CLERKSHIP	SERVICE START DATE	SERVICE END DATE	MEDICAL STUDENT LEVEL
Drain	Course Director	Methods & Logic in Medicine 1	07/01/08	06/30/09	MS-1
Drain	Course Director	Methods & Logic in Medicine 2	07/01/08	12/31/08	MS-2
Duker	Course Director	Digestion & Nutrition	07/01/08	06/30/09	MS-2
Duker	Course segment coordinator (3 or more sessions)	MS-1 Cellular & Pathologic Basis of Disease	10/14/08	11/15/08	MS-1
Duker	Course laboratory segment/session coordinator (3 or more sessions)	MS-2 Reproductive & Developmental Biology	02/09/09	02/27/09	MS-2
Ryan	Block Coordinator	Organ Systems Physiology Block	07/01/08	06/30/09	MS-1
Ryan	Block Coordinator	Fundamentals of Basic Science Block	07/01/08	06/30/09	MS-1
Watkins	Longitudinal Curriculum Program (LCP) Director	Intensive Laboratory Research Experience	05/23/09	05/29/09	MS-1
Frizzell	Longitudinal Curriculum Program (LCP) Director	Intensive Laboratory Research Experience	05/23/09	05/30/09	MS-1
Walker	Longitudinal Curriculum Program (LCP) Director	Intensive Laboratory Research Experience	05/23/09	05/30/09	MS-1

Mentored Scholarly Project Mentoring

FAC LAST NAME	ACTIVITY TYPE	STUDENT NAME	PROJECT OR RESEARCH SUBJECT / TITLE	PERIOD START DATE	PERIOD END DATE	DEGREE PROGRAM
Wan	MSP Mentor	Kim, Hyun	Beating the system: The potential role of Cdh1 in cardiomyocyte regenerative thereapy	11/28/08	06/30/09	MS-2





Summer Research Mentoring

FAC LAST NAME	ACTIVITY TYPE	STUDENT NAME	PROJECT OR RESEARCH SUBJECT / TITLE	PERIOD START DATE	PERIOD END DATE	DEGREE PROGRAM
Wan	Summer Research Mentor	Kim, Hyun	Dissecting the Cdh1/APC Pathway in Stem Cell Self-renewal	06/01/08	08/30/08	MS-2
Watkins	Summer Research Mentor	Levenson, Joshua	Live-cell imaging of dendritic cells during transendothelial migration	06/01/08	08/30/08	MS-2

Medical Student Advising

FAC LAST NAME	ACTIVITY TYPE	STUDENT NAME	PERIOD START DATE	PERIOD END DATE	DEGREE PROGRAM
Duker	Fast Advisint	Fizergerald, Jocelyn	07/01/08	06/30/09	MS-1
Duker	Fast Advisint	Gebbardt, Kory	07/01/08	06/30/09	MS-1
Duker	Fast Advisint	Kim, Joseph	07/01/08	06/30/09	MS-1
Duker	Fast Advisint	Murphy, Jessica	07/01/08	06/30/09	MS-1
Duker	Fast Advisint	Tetreault, Matthew	07/01/08	06/30/09	MS-1
Duker	Fast Advisint	Hsieh, Lily	07/01/08	06/30/09	MS-1
Duker	Fast Advisint	Wong, Jeff	07/01/08	06/30/09	MS-1
Duker	academic advising (3 or more meetings with student)	Singleton, Alex	07/01/08	06/30/09	MS-1
Duker	academic advising (3 or more meetings with student)	Singh, Keerat	07/01/08	06/30/09	MS-1
Duker	academic advising (3 or more meetings with student)	McLaughlin, Joseph	07/01/08	06/30/09	MS-1
Duker	academic advising (3 or more meetings with student)	Caporaso, Jenna	07/01/08	06/30/09	MS-4

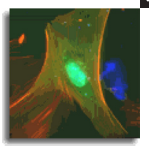
Medical Student Committee Activities

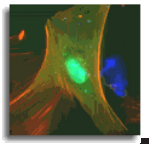
FAC LAST NAME	COMMITTEE NAME:	COMMITTEE ROLE	SERVICE START DATE	SERVICE END DATE
Drain	Admissions Interviewer	Member	07/01/08	06/30/09
Drain	Course Design Group - Methods and Logic in Medicine 2	Member	07/01/08	06/30/09
Duker	Course Design - Digestion and Nutrition	Member	07/01/08	06/30/09
Duker	Course Design Group - Cell Tissue and Physiology	Member	07/01/08	06/30/09
Duker	MS Promotion Committee	Member	07/01/08	06/30/09
Duker	Undergraduate Medical Education Teaching Coordinator (UMETC)	Member	07/01/08	06/30/09
Murray	Course Design Group - Medical Anatomy	Member	07/01/08	06/30/09
Ryan	Admissions Interviewer	Member	07/01/08	06/30/09

Ryan	Course Design - Digestion and Nutrition	Member	07/01/08	06/30/09	
Ryan	Curriculum	Member	07/01/08	06/30/09	
Ryan	Honors Committee (Cum Laude Committee)	Member	07/01/08	06/30/09	
Ryan	Promotions	Member	07/01/08	06/30/09	
Ryan	Retention Committee MS 3 & 4	Member	07/01/08	06/30/09	

AOC-LCP Activities

FAC LAST NAME	AOC/LCP ACTIVITY TYPE	AOC/LCP ACTIVITY TITLE	AOC/LCP NAME	DATE	START TIME	END TIME	STUDENT DEGREE PROGRAM
Frizzell	lecture	ProteinExpression in a Heterologous Expression System	Intensive Laboratory Research Experience	05/23/09	18:00	23:00	MS-1
Frizzell	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/24/09	8:30	19:30	MS-1
Frizzell	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/25/09	8:30	14:30	MS-1
Frizzell	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/26/09	8:30	19:30	MS-1
Frizzell	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/27/09	8:30	17:30	MS-1
Frizzell	Lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/28/09	8:30	19:30	MS-1
Frizzell	Lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/29/09	8:30	14:30	MS-1
Peters	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/23/09	18:00	23:00	MS-1
Peters	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/24/09	8:30	19:30	MS-1
Peters	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/25/09	8:30	14:30	MS-1
Peters	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/26/09	8:30	19:30	MS-1
Peters	lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/27/09	8:30	17:30	MS-1
Peters	Lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/28/09	8:30	19:30	MS-1
Peters	Lecture	Intensive Laboratory Research Experience	Protein Expression in a Heterologous Expression System	05/29/09	8:30	14:30	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/23/09	18:00	23:00	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/24/09	8:30	19:30	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/25/09	8:30	14:30	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/26/09	8:30	19:30	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/27/09	8:30	17:30	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/28/09	8:30	19:30	MS-1
Walker	Lecture	Intensive Laboratory Research Experience	Regulation of CREB and NF	05/29/09	8:30	14:30	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/23/09	18:00	23:00	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/24/09	8:30	19:30	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/25/09	8:30	14:30	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/26/09	8:30	19:30	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/27/09	8:30	17:30	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/28/09	8:30	19:30	MS-1
Watkins	Lecture	Intensive Laboratory Research Experience	Confocal microscopy and Image analysis	05/29/09	8:30	14:30	MS-1

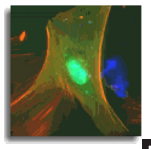




Graduate Student Instructional Activities

FAC LAST NAME	ACTIVITY TYPE	ACTIVITY TITLE	COURSE/PROGRAM TITLE			DATE
START TIME	END TIME	STUDENT DEGREE PROGRAM				
Aridor	Lecture	The UPR	INTBP 2000: Foundations of Biomedical Science	11/18/08	9:00	11:00	PHD
Aridor	Lecture	Vesicle formation and fusion	INTBP 2000: Foundations of Biomedical Science	11/24/08	9:00	11:00	PHD
Aridor	Workshop	COPII ER export and cargo selection	MSCBMP 2840: Regulation of Membran Traf	05/28/09	13:30	15:30	PHD
Aridor	Workshop	SNAREs and membrane fusion	MSCBMP 2840:Regulation of Membran Traf	06/11/09	13:30	15:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	09/17/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	09/24/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	10/01/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	10/08/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	10/15/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	10/22/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	10/29/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	11/5/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	11/10/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	11/12/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	11/19/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	12/03/08	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	01/14/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	01/21/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	01/28/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	02/04/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	02/11/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	02/18/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	02/25/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	03/04/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	03/11/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	03/18/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	03/25/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	04/01/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	04/15/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	04/22/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	04/29/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	05/06/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	05/13/09	10:30	11:30	PHD
Aridor	Small Group	Journal Club	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	05/20/09	10:30	11:30	PHD
Aridor	Lecture	ER Quality Control / ERAD / Unfolded Protein Response	MSCBMP 2880-Cell Biology of Normal and Diseased States	03/17/09	10:30	12:00	PHD
Aridor	Lecture	ER Quality Control / ERAD / Unfolded Protein Response	MSCBMP 2880-Cell Biology of Normal and Diseased States	03/19/09	10:30	12:00	PHD
Candrilli	Lecture	Lectures:Grants writing techniques	IMM 3240-Grant Writing	06/25/09	10:30	12:00	PhD
Candrilli	Lecture	Lectures: Polarized Epithelia	MSCBMP 2880-Cell Biology of Normal and Diseased States	02/10/09	10:30	12:00	PhD
Candrilli	Lecture	Lectures: Polarized Epithelia	MSCBMP 2880-Cell Biology of Normal and Diseased States	02/12/09	10:30	12:00	PhD
Candrilli	Lecture	Lectures: Polarized Epithelia	MSCBMP 2880-Cell Biology of Normal and Diseased States	02/24/09	10:30	12:00	PhD
Candrilli	Lecture	Lectures: Polarized Epithelia	MSCBMP 2880-Cell Biology of Normal and Diseased States	02/26/09	10:30	12:00	PhD
Candrilli	Lecture	Lectures:Viral Entry	MVM 2410/IDM 2002-Virology	01/28/09	14:00	15:00	PhD
Candrilli	Lecture	Lectures:Viral Entry	MVM 2410/IDM 2002-Virology	01/30/09	14:00	15:00	PhD
Condon	Lecture	uterus	MSCMP2730 Molecular mechanisms of tissue growth and differentiation	03/25/09	14:00	15:00	PHD
Devor	Lecture	Neurotransmission	INTBP 2000: Foundations of Biomedical Science	10/03/08	9:00	11:00	PHD
Devor	Lecture	Neurotransmission	INTBP 2000: Foundations of Biomedical Science	10/06/08	9:00	11:00	PHD

Devor	Lecture	Neurotransmission	INTBP 2000: Foundations of Biomedical Science	10/06/08	9:00	11:00	PHD
Devor	Lecture	ENaC Trafficking	MSCBMP 2880-Cell Biology of Normal and Diseased States	04/02/09	10:00	11:30	PHD
Devor	Lecture	Epithelial Transport	MSCBMP 2880-Cell Biology of Normal and Diseased States	04/07/09	10:00	11:30	PHD
Drain	Lecture	Insulin biogenesis and secretion in health	MSCBMP 2880-Cell Biology of Normal and Diseased States	01/13/09	10:30	12:00	PHD
Drain	Lecture	Insulin biogenesis and secretion disrupted in diabetes	MSCBMP 2880-Cell Biology of Normal and Diseased States	01/15/09	10:30	12:00	PHD
Frizzell	Lecture	Dynamics of CFTR at the plasma membrane	MSCBMP 2880: A novel mouse model to sort out cystic fibrosis	03/31/09	10:30	12:00	PhD
Frizzell	Lecture	Introduction to cystic fibrosis and CFTR	MSCBMP 2880: Cell Biology of Normal and Disease States	03/24/09	10:30	12:00	PhD
Frizzell	Lecture	Rodrigo Alzamora	MSCBMP 2855 Research Seminar/Molecular Physiology	09/08/08	9:30	10:30	PHD
Frizzell	Lecture	Michael Butterworth	MSCBMP 2855 Research Seminar/Molecular Physiology	09/15/08	9:30	10:30	PHD
Frizzell	Lecture	Ossama Kashlan	MSCBMP 2855 Research Seminar/Molecular Physiology	09/22/08	9:30	10:30	PHD
Frizzell	Lecture	Ken Hallows	MSCBMP 2855 Research Seminar/Molecular Physiology	09/29/08	9:30	10:30	PHD
Frizzell	Lecture	Cavita Chotoo	MSCBMP 2855 Research Seminar/Molecular Physiology	10/06/08	9:30	10:30	PHD
Frizzell	Lecture	Marcelo Carattino	MSCBMP 2855 Research Seminar/Molecular Physiology	10/13/08	9:30	10:30	PHD
Frizzell	Lecture	Nick Johnson	MSCBMP 2855 Research Seminar/Molecular Physiology	10/20/08	9:30	10:30	PHD
Frizzell	Lecture	Nuria Pastor-Soler	MSCBMP 2855 Research Seminar/Molecular Physiology	10/27/08	9:30	10:30	PHD
Frizzell	Lecture	Shaohu Sheng	MSCBMP 2855 Research Seminar/Molecular Physiology	11/03/08	9:30	10:30	PHD
Frizzell	Lecture	Darwin King	MSCBMP 2855 Research Seminar/Molecular Physiology	11/10/08	9:30	10:30	PHD
Frizzell	Lecture	Bob Edinger	MSCBMP 2855 Research Seminar/Molecular Physiology	11/17/08	9:30	10:30	PHD
Frizzell	Lecture	Tom Kleyman	MSCBMP 2855 Research Seminar/Molecular Physiology	11/24/08	9:30	10:30	PHD
Frizzell	Lecture	Agnes Urban	MSCBMP 2855 Research Seminar/Molecular Physiology	12/01/08	9:30	10:30	PHD
Frizzell	Lecture	Mike Myerburg	MSCBMP 2855 Research Seminar/Molecular Physiology	12/08/08	9:30	10:30	PHD
Frizzell	Lecture	Chris Passero	MSCBMP 2855 Research Seminar/Molecular Physiology	12/15/08	9:30	10:30	PHD
Frizzell	Lecture	Tom Kleyman	MSCBMP 2855 Research Seminar/Molecular Physiology	01/12/09	9:30	10:30	PHD
Frizzell	Lecture	Shaohu Sheng	MSCBMP 2855 Research Seminar/Molecular Physiology	01/26/09	9:30	10:30	PHD
Frizzell	Lecture	Marcelo Carattino	MSCBMP 2855 Research Seminar/Molecular Physiology	02/02/09	9:30	10:30	PHD
Frizzell	Lecture	Cavita Chotoo	MSCBMP 2855 Research Seminar/Molecular Physiology	02/09/09	9:30	10:30	PHD
Frizzell	Lecture	Gunhild Mueller	MSCBMP 2855 Research Seminar/Molecular Physiology	02/16/09	9:30	10:30	PHD
Frizzell	Lecture	Ossama Kashlan	MSCBMP 2855 Research Seminar/Molecular Physiology	02/23/09	9:30	10:30	PHD
Frizzell	Lecture	Rodrigo Alzamora	MSCBMP 2855 Research Seminar/Molecular Physiology	03/02/09	9:30	10:30	PHD
Frizzell	Lecture	Chris Passero	MSCBMP 2855 Research Seminar/Molecular Physiology	03/16/09	9:30	10:30	PHD
Frizzell	Lecture	Mark Bailey	MSCBMP 2855 Research Seminar/Molecular Physiology	03/23/09	9:30	10:30	PHD
Frizzell	Lecture	Darwin King	MSCBMP 2855 Research Seminar/Molecular Physiology	03/30/09	9:30	10:30	PHD
Frizzell	Lecture	Agnes Urban	MSCBMP 2855 Research Seminar/Molecular Physiology	04/06/09	9:30	10:30	PHD
Frizzell	Lecture	Mike Myerburg	MSCBMP 2855 Research Seminar/Molecular Physiology	04/13/09	9:30	10:30	PHD
Frizzell	Lecture	Tom Kleyman	MSCBMP 2855 Research Seminar/Molecular Physiology	04/27/09	9:30	10:30	PHD
Frizzell	Lecture	Ken Hallows	MSCBMP 2855 Research Seminar/Molecular Physiology	05/04/09	9:30	10:30	PHD
Frizzell	Lecture	Nick Johnson	MSCBMP 2855 Research Seminar/Molecular Physiology	05/11/09	9:30	10:30	PHD
Frizzell	Lecture	Chris Passero	MSCBMP 2855 Research Seminar/Molecular Physiology	05/18/09	9:30	10:30	PHD
Frizzell	Lecture	Nuria Pastor-Soler	MSCBMP 2855 Research Seminar/Molecular Physiology	06/01/09	9:30	10:30	PHD
Frizzell	Lecture	Bob Edinger	MSCBMP 2855 Research Seminar/MolecularPhysiology	06/08/09	9:30	10:30	PHD
Hong	Lecture	polarity	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	02/24/09	10:30	12:00	PhD
Hong	Lecture	polarity and cancer	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	02/26/09	10:30	12:00	PhD
Leuba	Lecture	Chromatin and epigenetic	INTBP 2000: Foundations of Biomedical Science	10/23/08	9:00	11:00	PHD
Leuba	Lecture	Single Molecule Approaches	MSMBPH 2001	12/03/08	11:00	12:00	PHD
Leuba	Lecture	Single molecule Chromatin dynamics	MSMBPH 2003 - Molecular Biophysics 3: Biomol Interactions & Dynamics	01/08/09	13:00	14:30	PHD
Murray	Lecture	4. Adrenal	MSCMP 2730: Molecular Mechanisms of Tissue Growth and Differentiation	02/24/09	15:00	16:00	PHD
Plant	Lecture	The Male Reproductive System: Hormonal Regulation of Testis Development	MSCMP 2730 Molecular Mechanisms of Tissue Growth and Differentiation.	03/01/09	15:00	16:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/07/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/10/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/14/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/17/08	13:00	15:00	PHD



Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/21/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/24/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/28/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	10/31/08	13:00	15:00	PHD
Schmidt	Small Group	Conference	INTBP 2005: Foundations Conference	11/04/08	13:00	15:00	PHD
Stolz	Lecture	Labeling Techniques for Fluorescence Microscopy	Bioeng 2072	09/18/08	11:00	12:00	PHD
Stolz	Lecture	Mechanisms of Liver Angiogenesis	Bioeng 2072	09/23/08	11:00	12:00	PHD
Stolz	Lecture	EM Sample Prep and Processing	MSCBMP 2860 - Multiparametric Microscopic Imaging	05/26/09	9:30	11:00	PHD
Stolz	Lecture	Principles of TEM	MSCBMP 2860 - Multiparametric Microscopic Imaging	05/28/09	9:30	11:00	PHD
Stolz	Lecture	Principles of SEM	MSCBMP 2860 - Multiparametric Microscopic Imaging	06/02/20	9:30	11:00	PHD
Stolz	Lecture	Special Techniques in electron Microscopy	MSCBMP 2860 - Multiparametric Microscopic Imaging	06/04/09	9:30	11:00	PHD
Stolz	Lecture	Vasculogenesis and Angiogenensis	MSCMP 2730: Molecular Mechanisms of Tissue Growth and Differentiation	01/21/09	15:00	16:00	PHD
Stolz	Lecture	Angiogenesis in Development and Organogenesis	MSCMP 3750: ANGIOGENESIS	01/22/09	10:00	11:15	PHD
Stolz	Lecture	Angiogenesis in Wound Healing and Ischemic Diseases	MSCMP 3750: ANGIOGENESIS	01/29/09	10:00	11:15	PHD
Stolz	Lecture	Endothelial Cell Precursors and Their Application in Therapy	MSCMP 3750: ANGIOGENESIS	04/02/09	10:00	11:15	PHD
Thibodeau	Lecture	Protein structure	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	03/30/09	11:40	13:10	PHD
Thibodeau	Lecture	CFTR biogenesis and structure	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	04/09/09	11:40	13:10	PHD
Traub	Lecture	discussion of paper 3	INTBP 2000: Foundations of Biomedical Science	11/04/08	9:00	11:00	PHD
Traub	Lecture	protein import	INTBP 2000: Foundations of Biomedical Science	11/20/08	9:00	11:00	PHD
Traub	Lecture	vesicle formation and fusion	INTBP 2000: Foundations of Biomedical Science	12/01/08	9:00	11:00	PHD
Traub	Lecture	role of lipids in membrane traffic	INTBP 2000: Foundations of Biomedical Science	12/04/08	9:00	11:00	PHD
Traub	Lecture	methods based lecture	INTBP 2000: Foundations of Biomedical Science	12/05/08	9:00	11:00	PHD
Traub	Lecture	role of cytoskeleton in membrane traffic	INTBP 2000: Foundations of Biomedical Science	12/08/08	9:00	11:00	PHD
Traub	Exam	Exam 4	INTBP 2000: Foundations of Biomedical Science	12/12/08	9:00	11:00	PHD
Traub	Lecture	Protein biogenesis	MSIMB 2012: Approaches in Molecular Biology 2: Heart Disease	10/22/08	9:00	11:00	PHD
Traub	Lecture	LDL receptor mutations	MSIMB 2012: Approaches in Molecular Biology 2: Heart Disease	10/24/08	9:00	11:00	PHD
Traub	Small Group	LDL metabolism	MSIMB 2012: Approaches in Molecular Biology 2: Heart Disease	10/27/08	9:00	11:00	PHD
Walker	Lecture	Function and Regulation of Transcription Factors	MSBMG 3510: Advanced Topics and Gene Expression	09/08/08	10:00	11:30	PHD
Watkins	Lecture	intro to microscopy 1	MSCBMP 2860 - Multiparametric Microscopic Imaging	05/12/09	9:00	11:00	PHD
Watkins	Lecture	intro to microscopy 2	MSCBMP 2860 - Multiparametric Microscopic Imaging	05/14/09	9:00	11:00	PHD
Watkins	Lecture	Image Processing	MSCBMP 2860 - Multiparametric Microscopic Imaging	06/11/09	9:00	11:00	PHD
Watkins	Lecture	Live Cell imaging	MSCBMP 2860 - Multiparametric Microscopic Imaging	06/16/09	9:00	11:00	PHD
Watkins	Lecture	Multiphoton	MSCBMP 2860 - Multiparametric Microscopic Imaging	06/23/09	9:00	11:00	PHD
Walker	Lecture	cell cycle in relation to control of stem cell	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	01/27/09	10:30	12:00	PHD
Walker	Lecture	Molecular mechanisms	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	01/29/09	10:30	12:00	PHD
Walker	lecture	Function and Regulation of Transcription Factors	MSBMG 3510: Advanced Topics and Gene Expression	09/10/08	10:00	11:30	PHD

Graduate Student Administrative Activity

FAC LAST NAME	ACTIVITY TYPE	SERVICE COURSE / PROGRAM TITLE	SERVICE START DATE	STUDENT END DATE	DEGREE PROGRAM
Aridor	GS Journal Club/Seminar Director	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	08/26/08	12/11/08	PhD
Aridor	GS Journal Club/Seminar Director	MSCBMP 2852: Research Seminar/Cell Biology & Membrane Trafficking	01/05/09	04/23/09	PhD
Frizzell	GS Course Director	MSCBMP 2880: Cell Biology and Physiology of Normal and Disease States	01/06/09	04/26/09	PhD
Leuba	GS Course Director	MSMBPH 2003; Exper Dynam	01/01/09	04/30/09	PhD
Leuba	GS Course Director	MSMBPH 2030; Data Lit Club	09/01/08	06/01/09	PhD
Stolz	GS Course Director	MSCBMP 2860 Multiparametric Microscopic Imaging	05/12/09	09/01/09	PhD

Traub	GS Course Director	INTBP 2000: Foundations of Biomedical Science	08/25/08	12/12/08	PhD
Traub	GS Course Director	INTBP 2005: Foundations Conference	08/26/08	12/09/08	PhD
Frizzell	GS Course Director	MSCBMP 2855 Research Seminar/Molecular Physiology	9/8/2008	6/8/2009	PhD
Walker	GS Program Director	Cell Biology & Molecular Physiology	07/01/08	06/30/09	PhD

Graduate Student Mentoring Activity

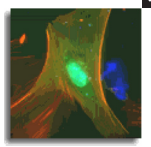
FAC LAST NAME	ACTIVITY TYPE	STUDENT NAME	PROGRAM	SERVICE START DATE	SERVICE END DATE	STUDENT DEGREE PROGRAM
Condon	Phd Mentor	Arvind Suresh	IBGP	05/01/09	06/30/09	PhD
Devor	PhD Mentor	Bailey, Mark	MSCBMP	07/01/09	06/30/09	PhD
Devor	PhD Mentor	Chotoo, Cavita	MSCBMP	07/01/09	06/30/09	PhD
Frizzell	PhD Mentor	Silvis, Mark	MSCBMP	07/01/08	06/30/09	PhD
Leuba	PhD Mentor	Fagerburg, Matthew	MBSB	07/01/08	06/30/09	PhD
Leuba	PhD Mentor	Schauer, Grant	MBSB	09/01/08	06/30/09	PhD
Murray	PhD Mentor	DeFranco, Bado	MSCBMP	07/01/08	06/30/09	PhD
Traub	PhD Mentor	Thieman, James	IBGP	07/01/08	06/30/09	PhD
Traub	PhD Mentor	Jha, Anupma	IBGP	07/01/08	06/30/09	PhD
Walker	PhD Mentor	Wood, Michelle	MSCBMP	07/01/09	06/30/09	PhD
Traub	GS academic advisor	Fierer, Jacob	PIMB	07/01/08	10/31/08	PhD

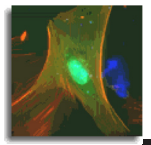
Graduate Student Lab Supervision Activity

FAC LAST NAME	PROGRAM	PERIOD START DATE	PERIOD END DATE	STUDENT WEEKS IN LAB:	STUDENT NAME	STUDENT DEGREE PROGRAM
Condon	IBGP	09/15/08	12/31/08	10	Jeon, Sohyun (Sophia)	PhD
Wan	IBGP	07/01/08	09/15/08	10	Proto, Jonathan	PhD

Graduate Student Committee Activity

FAC LAST NAME	COMMITTEE NAME	COMMITTEE ROLE	SERVICE START DATE	SERVICE END DATE	STUDENT DEGREE PROGRAM
Devor	IBGP Recruiting	Member	07/01/08	06/30/09	PhD
Leuba	MBSB Curriculum	Member	07/01/08	06/30/09	PhD
Leuba	MBSB Admissions	Member	07/01/08	06/30/09	PhD
Murray	Provost Developmental Fund Awards	Member	7/1/2008	06/09/09	PhD
Stolz	IBGP Summer Undergrad Research Program	Member	07/01/08	06/30/09	PhD
Traub	IBGP Curriculum	Member	07/01/08	06/30/09	PhD
Walker	IBGP Steering	Member	07/01/08	06/30/09	PhD
Walker	Graduate Council	Member	07/01/08	06/30/09	PhD
Wan	IBGP Admissions	Member	07/01/08	06/30/09	PhD



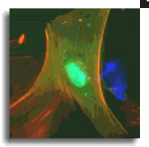


Graduate Student Comprehensive and Thesis Committee Activity

FAC LAST NAME	COMMITTEE STUDENT NAME	COMMITTEE TYPE	SERVICE ROLE	SERVICE START DATE	STUDENT DEGREE END DATE	PROGRAM
Aridor	Thieman, James	Dissertation	Chair	01/14/09	06/30/09	CBMP
Aridor	Guerriero, chris	Dissertation	Member	07/01/08	09/24/08	CBMP
Condon	Wood, Michelle	Dissertation	Member	07/01/08	06/30/09	CBMP
Devor	Silvis, Mark	Dissertation	Chair	07/01/08	06/30/09	CBMP
Devor	Bernal, Paula	Dissertation	Member	07/01/08	06/30/09	CBMP
Drain	DeFranco, Bado	Dissertation	Chair	07/01/08	06/30/09	CBMP
Drain	Chotoo, Cavita	Dissertation	Member	01/15/09	06/30/09	CBMP
Drain	Bailey, Mark	Dissertation	Member	07/01/08	06/30/09	CBMP
Frizzell	Bailey, Mark	Dissertation	Chair	07/01/08	06/30/09	CBMP
Frizzell	Tran, Joseph	Comprehensive	Member	07/28/08	06/30/09	BMG
Frizzell	Tran, Joseph	Dissertation	Member	01/15/09	06/30/09	BMG
Hong	Chotoo, Cavita	Dissertation	Chair	01/15/09	06/30/09	CBMP
Leuba	Adelajda Zorba	Comprehensive	Chair	09/10/08	09/10/08	MBSB
Leuba	Nora, Gerald	Dissertation	Member	12/05/08	06/30/09	MBSB
Murray	Roh, Daniel	Comprehensive	Chair	11/18/08	11/18/08	CBMP
Murray	Block, Ethan	Dissertation	Member	07/01/08	06/30/09	CBMP
Plant	Teisanu, Roxana	Dissertation	Member	07/01/08	06/30/09	CBMP
Stolz	Liang, Paulina	Dissertation	Chair	12/05/08	06/30/09	CMP
Stolz	Gregg, Siobhan	Dissertation	Member	05/20/09	06/30/09	CBMP
Stolz	Englert, Judson	Dissertation	Member	07/01/08	06/30/09	CMP
Stolz	Lam, Hilaire	Dissertation	Member	07/01/08	06/30/09	CMP
Stolz	Zhao, Jianping	Dissertation	Member	07/01/08	06/30/09	CMP
Stolz	Wang, Dan	Dissertation	Member	07/01/08	06/30/09	CMP
Stolz	Divito, Sherrie	Dissertation	Member	07/01/08	06/30/09	IMM
Traub	Steckbeck, Jonathan	Comprehensive	Chair	07/22/08	07/22/08	BMG
Traub	Kolb, Alex	Comprehensive	Member	08/15/08	08/15/08	PIMB
Traub	Cui, Shanshan	Dissertation	Member	07/01/08	06/30/09	CBMP
Traub	Bernal, Paula	Dissertation	Member	07/01/08	06/30/09	CBMP
Traub	Kolb, Alex	Dissertation	Member	01/15/09	06/30/09	PIMB
Walker	Block, Ethan	Dissertation	Chair	07/01/08	06/30/09	CBMP
Walker	Teisanu, Roxana	Dissertation	Chair	07/01/08	06/30/09	CBMP
Walker	Roh, Daniel	Comprehensive	Member	11/18/08	11/18/08	CBMP
Walker	Balakrishnan, Ashwini	Dissertation	Member	01/30/09	06/30/09	CMP
Walker	Phillips, Bart	Dissertation	Member	07/01/08	06/30/09	BMG
Walker	Burke, Susan	Dissertation	Member	07/01/08	06/30/09	BMG
Walker	Mburu, Yvonne	Dissertation	Member	07/01/08	06/30/09	IMM
Watkins	Gregg, Siobhan	Dissertation	Chair	05/20/09	06/30/09	CBMP
Watkins	Bernal, Paula	Dissertation	Chair	07/01/08	06/30/09	CBMP
Watkins	Thieman, James	Dissertation	Member	01/14/09	06/30/09	CBMP
Watkins	Berk, Erik	Dissertation	Member	12/16/08	06/30/09	IMM
Watkins	Pardee, Angela	Dissertation	Member	07/01/08	06/30/09	IMM
Watkins	Thomas, Louis	Dissertation	Member	07/01/08	06/30/09	IMM
Watkins	Koppanati, Bhanu	Dissertation	Member	07/01/08	06/30/09	BMG
Zeleznik	Wood, Michelle	Dissertation	Chair	07/01/08	06/30/09	CBMP
Zhao	Burke, Susan	Dissertation	Chair	07/01/08	06/30/09	BMG
Zhao	DeFranco, Bado	Dissertation	Member	07/01/08	06/30/09	CBMP

Post Doctoral Personnel Data
[Current as of June, 2010]

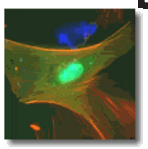
Name	Title	Office Address	Email Address	Office Phone	Fax	Research Focus
Ahner, Annette	Post Doctoral Associate	S373 BSTWR	aschneid@pitt.edu	412-648-8162	412-648-8330	Frizzell Lab
Balut Corina M.	Post Doctoral Associate	S331 BSTWR	cmb89@pitt.edu	412-383-7192	412-648-8330	Devor Lab
Caltagarone, John	Post Doctoral Associate	S372 BSTWR	jmcalt@pitt.edu	412-648-9260	412-648-8330	Sorkin Lab
Chakraborty, Souvik	Post Doctoral Associate	S306 BSTWR	soc11@pitt.edu	412-624-9713	412-648-8330	Traub Lab
Dong, Wei	Post Doctoral Associate	S333 BSTWR	wed16@pitt.edu	412-648-2846	412-648-8330	Hong Lab
Ernst, Wayne L.	Post Doctoral Associate	S307 BSTWR	wle3@pitt.edu	412-624-1971	412-648-8330	Aridor Lab
Gao, Yajuan	Post Doctoral Associate	S331 BSTWR	yag4@pitt.edu	412-648-7296	412-648-8330	Devor Lab
Gong, Xiaoyan	Research Associate	S372 BSTWR	xig17@pitt.edu	412-383-6958	412-648-8330	Frizzell Lab
Hu, Dong	Post Doctoral Associate	2.7 Hillman Cancer	doh16@pitt.edu	412-623-7811	412-623-7761	Wan Lab
Liu, Weijie	Post Doctoral Associate	S333 BSTWR	wel51@pitt.edu	412-648-2846	412-648-8330	Hong Lab
Long, Kimberly	Post Doctoral Associate	S307 BSTWR	krl34@pitt.edu	412-624-1971	412-648-8330	Aridor Lab
Noel, Sabrina	Post Doctoral Associate	S372 BSTWR	snoel2@pitt.edu	412-648-9260	412-648-8330	Frizzell Lab
Perunthathu, Umasankar	Post Doctoral Associate	S306 BSTWR	ukp1@pitt.edu	412-624-9713	412-648-8330	Traub Lab
Sanker, Subramaniam	Vis. Research Associate	S306 BSTWR	sus48@pitt.edu	412-624-9713	412-648-8330	Traub Lab
Shome, Kuntala	Vis. Research Associate	S307 BSTWR	shome@pit.edu	412-624-1971	412-648-8330	Aridor Lab
Subramanian, Supriya	Post Doctoral Associate	S332 BSTWR	sus51@pitt.edu	412-624-8933	412-648-8330	Thibodeau Lab
Zhang, Liang	Post Doctoral Associate	S332 BSTWR	liz46@pitt.edu	412-624-8933	412-648-8330	Thibodeau Lab
Zhang, Liyong	Post Doctoral Associate	2.7 Hillman Cancer	zhangl5@upmc.edu	412-623-7811	412-623-7761	Wan Lab
Zhou, Wenke	Post Doctoral Associate	S333 BSTWR	wez23@pitt.edu	412-648-2846	412-648-8330	Hong Lab



Current Cell Biology and Molecular Physiology Graduate Program Students

Student	Mentor	Year
Mark A. Bailey	Dr. Daniel Devor	8th
Paula J. Bernal	Dr. Claudette St. Croix	6th
Ethan Block	Dr. Jess Klarlund	6th
Cavita Chotoo	Dr. Daniel Devor	5th
ShanShan Cui	Dr. Ora Weisz	5th
Bado Hewa DeFranco	Dr. Sandra Murray	8th
Elizabeth Delorme-Axford	Dr. Carolyn Coyne	2nd
Siobhan Gregg	Dr. Laura Niedernhofer	4th
Anupma Jha	Dr. Linton Traub	5th
Xinxian Qiao	Dr. Yong Wan	2nd
Daniel Roh	Dr. James Funderburgh	4th
Mark Silvis	Dr. Raymond Frizzell	8th
Arvind Suresh	Dr. Jennifer Condon	2nd
Christina Szalinski	Dr. Ora Weisz	2nd
James Thieman	Dr. Linton Traub	5th

Cell Biology and Physiology/Pharmacology Machine Shop



Graduates of the Cell Biology and Molecular Physiology Program
(Past five years)

Roxana Teisanu
Defended April 30, 2009
Ecole Politechnique Federal de Lausanne (EPFL), Switzerland

Michelle Wood
Defended April 29, 2009
University of Michigan, Ann Arbor, MI

Dan Constantinescu
Defended December 8, 2008
Law School - California

Christopher Guerriero
Defended September 24, 2008
University of Pittsburgh Medical School

Mark Miedel
Defended August 27, 2008
University of Pittsburgh Medical School

Christopher Lewarcick
Defended August 18, 2008
University of Pittsburgh Medical School

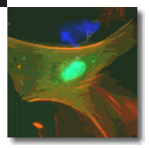
Asli Matos-Oztan
Defended November 20, 2007
Children's Hospital
Harvard Medical School, Boston, MA

Anna Zemke
Defended August 29, 2007
University of Pittsburgh Medical School

Elena Balestreire
Defended June 4, 2007
University of Pittsburgh Medical School

Peter Keyel
Defended August 21, 2006
University of St. Louis, St. Louis, MO

Matthew Hawryluk
Defended August 9, 2006



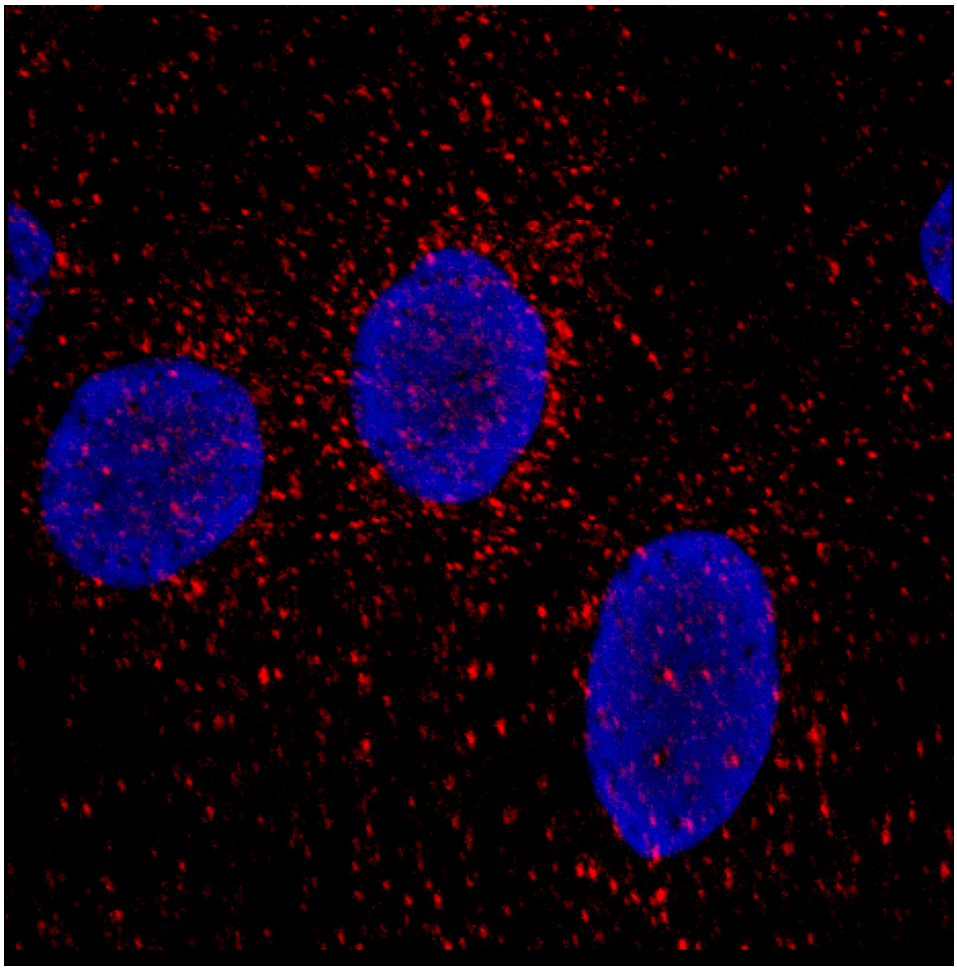
Carnegie Mellon University Graduate School

Adedotun Adebamiro
Defended July 13, 2006
University of Pittsburgh Medical School

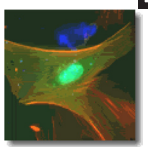
Romesh Draviam
Defended June 13, 2006
Molecular Devices, Sunnyvale, CA

Mark Ellis
Defended January 23, 2006
Columbia University, New York, NY

Marjet Heitzer
Defended September 26, 2005
University of Pittsburgh, Dean's Office



Michael Butterworth. Immunofluorescent labeling of early endosomal compartments (EEA1) in mouse kidney epithelial cells. ENaC traffics through these vesicles en route to recycling back to the membrane surface.

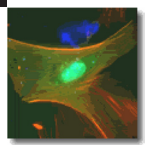


Student Ratings of CBMP Faculty Teaching FY2010

Name	Course	Type	Date	Rating	Ave
Drain	Methods and Logic in Medicine Part 2	SGCS	Fall-09	4.90	
Drain	Methods and Logic in Medicine Part 1	SGCS	Spring -10	4.90	4.90
Duker	Introduction to Being a Physician	SGCS	Fall-09	3.80	
Duker	Body Fluid Homeostasis Cardiovascular	WKSP	Fall-09	4.20	
Duker	Body Fluid Homeostasis-Renal Segment	LEC	Fall-09	4.60	
Duker	Cellular and Pathological Basis of Disease	LEC	Fall-09	4.10	
Duker	Cellular and Pathological Basis of Disease	LSB	Fall-09	4.70	
Duker	Digestion and Nutrition	LEC	Fall-09	4.90	
Duker	Digestion and Nutrition	LAB	Fall-09	4.60	
Duker	Endocrine	LEC	Spring-10	5.00	
Duker	Integrated Case Studies	SGCS	Spring-10	4.70	
Duker	Neuroscience	WKSP	Spring-10	4.90	
Duker	Neuroscience	LAB	Spring-10	5.00	
Duker	Reproductive & Developmental Biology	LEC	Spring-10	5.00	4.63
Gay	Body Fluid Homeostasis Cardiovascular	WKSP	Fall-09	3.10	
Gay	Fuel Metabolism	WKSP	Spring-10	4.10	3.60
Murray	Medical Anatomy	LEC	Fall-09	4.10	
Murray	Medical Anatomy	LAB	Fall-09	4.30	
Murray	Medical Anatomy	SGCS	Fall-09	4.40	4.27
Ryan	Introduction to Being a Physician	SGCS	Fall-09	4.90	
Ryan	Body Fluid Homeostasis Cardiovascular	WKSP	Fall-09	4.60	
Ryan	Cellular and Pathological Basis of Disease	LEC	Fall-09	4.50	
Ryan	Digestion and Nutrition	LEC	Fall-09	3.00	
Ryan	Reproductive & Developmental Biology	LEC	Spring-10	4.60	
Ryan	Reproductive & Developmental Biology	SGCS	Spring-10	4.60	
Ryan	Integrated Case Studies	SGCS	Spring-10	4.30	4.36
Salama	Body Fluid Homeostasis Cardiovascular	LEC	Fall-09	2.60	2.6
Stolz	Cellular and Pathological Basis of Disease	LEC	Fall-09	3.20	
Stolz	Cellular and Pathological Basis of Disease	PBL	Fall-09	4.70	
Stolz	Digestion and Nutrition	LEC	Fall-09	4.30	4.07
Watkins	Intensive Laboratory Research Experience	LEC	Spring -10	4.60	
Watkins	Cellular and Pathological Basis of Disease	LEC	Fall-09	4.40	4.50
	Overall Teaching Average			**4.10**	

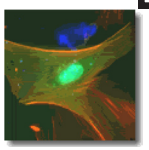
Type codes:

LEC	Lecture
PBL	Practice Based Learning
WKSP	Workshop
SGCS	Small Group Conference Session
AP	Applications Staff
LAB	Laboratory



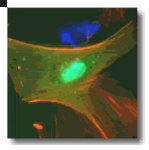
CBP FACULTY ROSTER
(Effective June, 2010)

Last Name	First	Rank	Status
Sorkin	Alexander	Professor & Chair	Tenured
Frizzell	Raymond	Professor	Tenured
Murray	Sandra	Professor	Tenured
Salama	Guy	Professor	Tenured
Watkins	Simon	Professor	Tenured
Aridor	Meir	Associate Professor	Tenured
Devor	Daniel	Associate Professor	Tenured
Drain	Peter	Associate Professor	Tenured
Gay	Vernon	Associate Professor	Tenured
Leuba	Sanford	Associate Professor	Tenured
Ryan	Kathleen	Associate Professor	Tenured
Stolz	Donna	Associate Professor	Tenured
Traub	Linton	Associate Professor	Tenured
Wan	Yong	Associate Professor	Tenured
Zhao	Allan	Associate Professor	Tenured
Butterworth	Michael	Assistant Professor	Tenure Track
Hong	Yang	Assistant Professor	Tenure Track
Thibodeau	Patrick	Assistant Professor	Tenure Track
Duker	Georgia	Assistant Professor	Non-tenure Track
Baty	Catherine	Res. Assistant Professor	Non-tenure Track
Bertrand	Carol	Res. Assistant Professor	Non-tenure Track
Peters	Kathryn	Res. Assistant Professor	Non-tenure Track
Rodriguez-Collazo	Pedro	Res. Assistant Professor	Non-tenure Track
Schmidt	Bela	Res. Assistant Professor	Non-tenure Track
Sun	Fei	Res. Assistant Professor	Non-tenure Track



New CBP Faculty in FY10

Name	Prior Institution /Rank	Current Rank
Paul J. Sammak	University of Pittsburgh Department of Obstetrics abd Gynecology	Visiting Associate Professor
Alexander D. Sorkin	University of Colorado Health Sciences Department of Pharmacology	Chair & Professor



Faculty Honors, Recognition and Professional Affiliations (Fiscal Year 2009-10)

Meir Aridor, Ph.D.
Associate Professor

Member, Society for Neuroscience

Catherine J. Baty, D.V.M., Ph.D.
Research Assistant Professor

Member, American College of Veterinary Internal Medicine
Member, American Heart Association

Carol A. Bertrand, Ph.D.
Research Assistant Professor

Member, Biophysical Society
Member, American Physiological Society

Michael Butterworth, Ph.D.
Assistant Professor

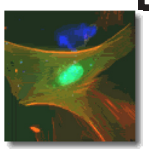
Member, American Physiological Society
Member, Salt and Water Club

Daniel C. Devor, Ph.D.
Associate Professor

Member, American Physiological Society
Member, Biophysical Society
Member, Mount Desert Island Biological Laboratory
William Evans Visiting Fellow - University of Otago, Dunedin, NZ

Peter F. Drain, Ph.D.
Associate Professor

Member, Biophysical Society
Member, American Association for the Advancement of Science
Member, Society of General Physiologists
Member, American Diabetes Association



Raymond A. Frizzell, Ph.D.
Professor and Director of Cystic Fibrosis Center

Member, American Physiological Society

Member, Society of General Physiologists

Member, Mount Desert Island Biological Laboratory
Trustee, Mount Desert Island Biological Laboratory
Member, American Society for Cell Biology
Member at Large, Medical Advisory Council, Cystic Fibrosis Foundation
Member, Salt and Water Club

Vernon Gay, Ph.D.
Associate Professor

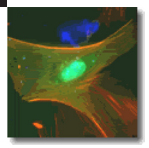
Member, Society for the Study of Reproduction (SSR)
Member, Endocrine Society
Member, International Society of Neuroendocrinology

Sanford Leuba, Ph.D.
Associate Professor

Member, Biophysical Society

Sandra A. Murray, Ph.D.
Professor

Member, American Society for Cell Biology
Member, Society for In Vitro Biology
Member, The Pittsburgh Cancer Institute
Member, Corporation of the Marine Biological Laboratory
Member, Cell Transplant Society
Member, Endocrine Society
Member, American Physiological Society
Member, International Society for Preventive Oncology
University of Pittsburgh Helen Faison Council of Elders
School of Medicine Summer "Minority" Work-Study Program
Member, Medical Student Promotions Committee
Committee – Child Health Research Center Grant
Member, Training Faculty Immunology Graduate Training Program
Provost's Committee on Diversity



Kathleen D. Ryan, Ph.D.
Associate Professor

Member, Society for the Study of Reproduction (SSR)
Member, Endocrine Society
Member, Society for Neuroscience

Guy Salama, Ph.D.
Professor

Member, Biophysical Society
Member, Marine Biological Laboratory
Member, Basic Science Council of the American Heart Association
Fellow, American Heart Association
Member, Heart Rhythm Society

Alexander D. Sorkin, Ph.D.
Richard B. Mellon Professor and Chairman

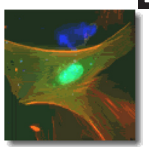
American Society for Cell Biology
ASPET
Society for Neuroscience

Donna B. Stolz, Ph.D.
Associate Professor

Member, American Society for Cell Biology
Member, Microscopy Society of America
Member, North American Vascular Biology Association
Member, American Society for the Study of Liver Diseases
Member, American Society for Investigative Pathology

Linton M. Traub, Ph.D.
Associate Professor

Member, American Society for Cell Biology
American Association for the Advancement of Science
American Society for Biochemistry and Molecular Biology



Yong Wan, Ph.D.
Associate Professor

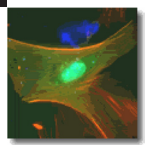
Member, American Association for Cancer Research
Member, American Association of Cell Biology
Member, American Association for The Advancement of Science

Simon C. Watkins, Ph.D.
Professor and Vice Chairman, Director of Center of Biologic Imaging

Member, The Pittsburgh Cancer Institute
Microscopy Society of America

Allan Z. Zhao, Ph.D.
Associate Professor

Member, American Association for the Advancement of Science
Member, American Diabetes Association



Faculty Presentations (Fiscal Year 2009-2010)

Meir Aridor, Ph.D.
Associate Professor

"Membrane Shaping in Vesicular Traffic: Exit from the Endoplasmic Reticulum", Physics Department, Carnegie Mellon University, Pittsburgh, PA, October 2009

"CFTR biogenesis and lipid homeostasis", CF Center, University of Pittsburgh, School of Medicine, April 2010

Catherine J. Baty, Ph.D.
Research Assistant Professor

Gordon Conference Presentation, "Molecular Mechanisms in Lymphatic Function and Disease" , Lucca, IT, June 2010

Carol A. Bertrand, Ph.D.
Research Assistant Professor

NACFC The Molecular Biology of CF - Related Ion Channels and Transporters: "SLC26A9" Constitutively Active, CFTR-regulated Anion conductance in Human Bronchial Epithelia, Minneapolis, MN, October 2009

Michael Butterworth, Ph.D.
Assistant Professor

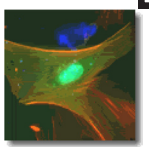
"Regulation of the Epithelial Sodium Channel by Trafficking and Recycling" Department of Physiology & Biophysics, Case Western Reserve University, Cleveland, OH, 2009

Daniel C. Devor, Ph.D.
Associate Professor

"Trafficking of KCa2.3 and KCa3.1 from the plasma membrane." University of Otago, Department of Physiology, Dunedin, New Zealand, November 2009

"Role of S6 in the Ca^{2+}-dependent gating of KCa3.1." University of Otago, Department Pharmacology, Dunedin, New Zealand, November 2009

"Expression of a KCa2.3 homologue in *C. elegans*" Renal Research Conference, Combio 2009, Meeting, Christchurch, New Zealand, December 2009.



"KCa2.3 and KCa3.1 at the Plasma Membrane: Where do we go from here?" Combio2009 Meeting, Christchurch, New Zealand, December 2009

Raymond A. Frizzell, Ph.D.
Professor, Director of Cystic Fibrosis Center

UNC Chapel Hill Seminar Series, "A new chloride channel in cystic fibrosis" May 2010

Yang Hong, Ph.D.
Assistant Professor

West China Developmental & Stem Cell Institute, Sichuan University West China Women's & Children's Hospital, May 2010
Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, July 2009
West China Developmental & Stem Cell Institute, Sichuan University West China Women's & Children's Hospital, July 2009
Cell Contact & Adhesion, Gordon Research Conference, July 2009

Sanford H. Leuba, Ph.D.
Associate Professor

Kathryn W. Peters, Ph.D.
Research Assistant Professor

Intensive Laboratory Research Experience, "Protein Expression in a Heterologous System", Mount Desert Island Biological Laboratory, Bar Harbor, ME - 2010

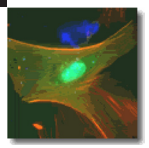
Rodriguez-Collazo, Ph.D.
Research Assistant Professor

Invited talk, Pittsburgh Science "Wham! Bam! Pow! Histone isolation and fractionation, in the blink of an eye, preserving their native covalent modifications" October 2009

Invited talk: 3rd PepCon conference "After a Solution for the Machines of Life" , Beijing, China. March 2010

Alexander D. Sorkin, Ph.D.
Richard B. Mellon Professor and Chairman

University of Pittsburgh, Cell Biology and Physiology Local Traffic Symposium "Role of



ubiquitination in trafficking" May 2010
Symposium "Role of ubiquitination in trafficking" Paris, France May, 2010

Gordon Conference. Lysosomes and endocytosis. June 2010

System Biology Symposium, Pittsburgh, November 2009

Children's Hospital, Pittsburgh, Department of Pediatrics Molecular Medicine Seminar, June 2010

Donna Beer Stolz, Ph.D.
Associate Professor

"Words and Images – Science and Art" U. Pitt – Titusville, September 2009

Patrick H. Thibodeau, Ph.D.
Assistant Professor

"What's wrong with ΔF508?", North American Cystic Fibrosis Conference, Minneapolis, MN October 2009

Yong Wan, Ph.D.
Associate Professor

The role of proteolysis in cell cycle, genomic integrity and carcinogenesis. duPont Hospital for Children, Nemours Biomedical Research 2010

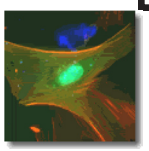
The role of UPS in cell cycle control and carcinogenesis. Department of Urology, University of Pittsburgh School of Medicine 2010

The role of Cdh1/APC in cell cycle, differentiation and cancer formation. The National Taiwan University 2009

Simon C. Watkins, Ph.D.
Professor and Vice Chairman
Director of Center of Biologic Imaging

DC-DC communication: Invited Speaker: Cell-Cell Fusion Gordon Research Conference, New London, NH, July 2009

Novel tools novel questions: the future of Imaging. Invited speaker, University of Southern California, August 2009



Imaging Fast, Furious and Deep. Science 2009, Invited Speaker, University of Pittsburgh

Multiphoton Opportunities in Vascular Biology: Invited Spearker, Mcgowan Insititute for Regenerative Medicine March 2010

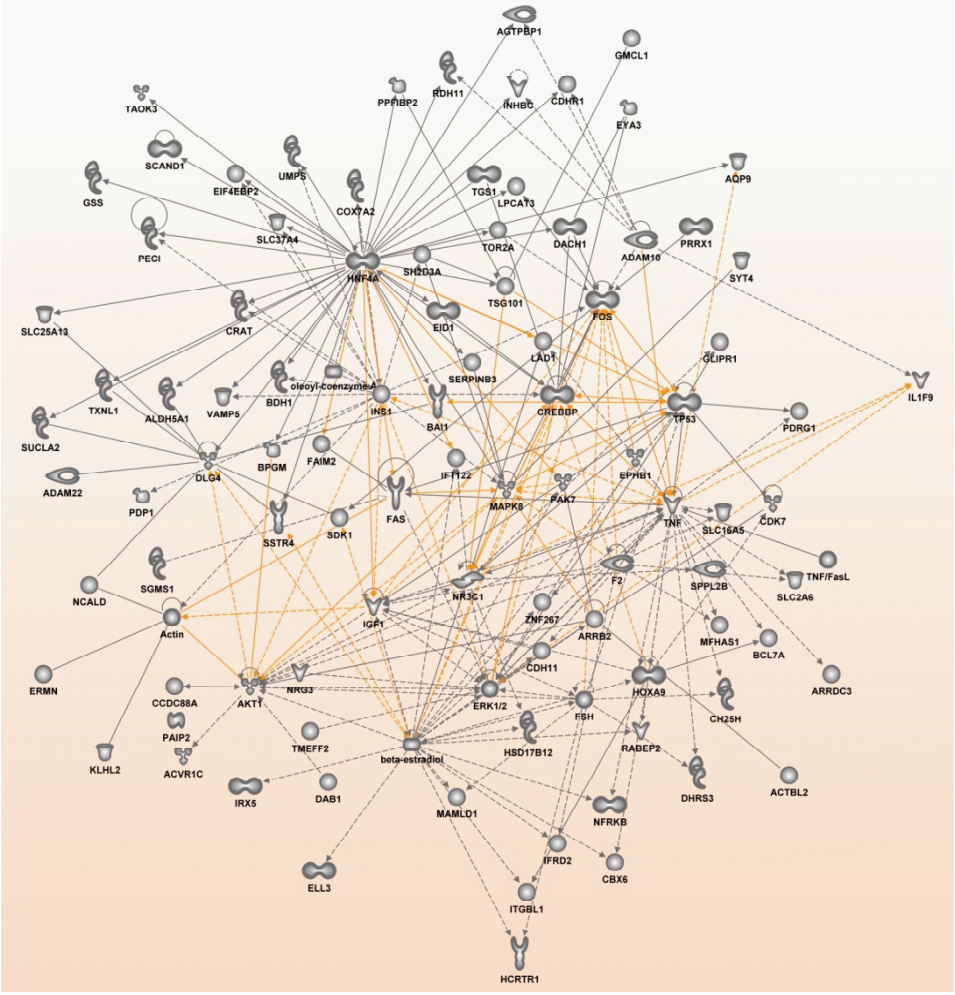
Imaging immunity: Invited Speaker Marquette University; Milwaukee, WI. May 2010

Applications of Optical Imaging Marquette University Milwaukee, WI. May 2010

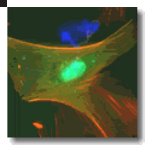
Intensive course in Physiology MDIBL Maine, Invited Lecturer/Course Director. May 2009

Course Director "Quantitative Fluorescence Microscopy", Mount Desert Island Biological Laboratories Maine. June 2010

Cancer Imaging Camp Invited Speaker and Director optical section, Washington University June 2010



Michael Butterworth. Schematic diagram depicting gene interactions for the predicted targets of regulated miRNAs identified by array analysis. (see heatmap)



Peer Reviewed Publications (Fiscal Year 2007-10)

Meir Aridor, Ph.D.
Associate Professor

Takayuki Iinuma, Akiko Shiga, Koji Nakamoto, Matthew B. O'Brien, Meir Aridor, Nagisa Arimitsu, Mitsuo Tagaya, and Katsuko Tani (2007) Mammalian Sec16/p250 plays a role in membrane traffic from the endoplasmic reticulum. *J. Biol. Chem.* 282(24):17632-9

Gunhild M. Mueller, Ossama B. Kashlan, James B. Bruns, Ahmad B. Maarouf, Meir Aridor, Thomas R. Kleyman and Rebecca P. Hughey (2007) Epithelial sodium channel (ENaC) exit from the endoplasmic reticulum is regulated by a signal within the carboxyl cytoplasmic domain of the α subunit *J. Biol. Chem.* 282(46):33475-83

Béla Z. Schmidt, Rebecca J. Watts, Meir Aridor and Raymond A. Frizzell (2009). Cysteine String Protein promotes proteasomal degradation of CFTR by increasing its interaction with CHIP and promoting CFTR ubiquitylation . *J Biol Chem.* 13; 284(7): 4168-78.

M. Aridor and K. N. Fish (2009) Selective Targeting and Regulation of ER Exit Sites Supports Axon Development*Traffic* 10(11):1669-84.

Kimberly R. Long, Yasunori Yamamoto, Adam L. Baker, David klinkenberg, Carolyn B.Coyne, Simon C. Watkins, James F. Conway and Meir Aridor (2010) Sar1 Assembly Regulates Membrane constriction and ER export. *J. Cell Biol.* 12;190(1):115-28.

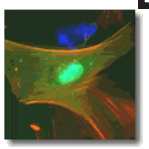
Catherine J. Baty, D.V.M., Ph.D.
Research Assistant Professor

Leaphart C, Qureshi F, Cetin S, Li J, Dubowski T, Baty C, Beer–Stolz D, Guo F, Murray S, Hackam D. Interferon-γ inhibits intestinal restitution by preventing gap junction communication between enterocytes. Gastroenterology, 2007; 132(7):2395-411.

London B, Michalec M, Mehdi H, Zhu X, Kerchner L, Sanyal S, Viswanathan PC, Pfahnl AE, Shang LL, Madhusudanan M, Baty CJ, Lagana S, Aleong R, Gutmann R, Ackerman MJ, McNamara DM, Weiss R, Dudley SC Jr. Mutation in glycerol-3-phosphate dehydrogenase 1 like gene (GPD1-L) decreases cardiac Na+ current and causes inherited arrhythmias. Circulation, 2007; 116(20):2260-8.

Jones HM, Bailey MA, Baty CJ, Macgregor GG, Syme CA, Hamilton KL, Devor DC. An NH2-terminal multi-basic RKR motif is required for the ATP-dependent regulation of hIK1. Channels, 2007; 1(2):80-91.

Finegold DN, Schacht V, Kimak MA, Lawrence EC, Foeldi E, Karlsson JM, Baty CJ, Ferrell RE. HGF and MET mutations in primary and secondary lymphedema. Lymph Res Biol, 2008; 6(2):69-76.



DeFranco BD, Nickel BM, Baty CJ, Martinez JS, Gay VL, Sandulache1 VC, Hackam DJ, and Murray SA. Migrating cells retain gap junction plaque structure and function. Cell Commun Adhes, 2008, 15(3):273-88.

Knickelbein JE, Khanna KM, Yee MB, Baty CJ, Kinchington PR, Hendricks RL. Noncytotoxic lytic granule-mediated CD8+ T cell inhibition of HSV-1 reactivation from neuronal latency. Science, 2008; 322(5899):268-71.

Wegiel B, **Baty CJ**, Gallo D, Csizmadia E, Scott JR, Akhavan A, Chin BY, Kaczmarek E, Alam J, Bach FH, Zuckerbraun BS, Otterbein LE. Cell surface biliverdin reductase mediates biliverdin-induced anti-inflammatory effects via phosphatidylinositol 3-kinase and Akt. J Biol Chem, 2009:284(32):21369-78.

Myerburg MM, King Jr JD, Oyster NM, Fitch AC, Magill A, **Baty CJ**, Watkins SC, Kolls JK, Pilewski JM, Hallows KR.AMPK Agonists Ameliorate Sodium and Fluid Transport and Inflammation in CF Airway Epithelial Cells. Am J Respir Cell Mol Biol. 2009: 42(6):676-84.

Wegiel B, Baty CJ, Gallo D, Csizmadia E, Scott JR, Akhavan A, Chin BY, Kaczmarek E, Alam J, Bach FH, Zuckerbraun BS, Otterbein LE. Cell surface biliverdin reductase mediates biliverdin-induced anti-inflammatory effects via phosphatidylinositol 3-kinase and Akt. J Biol Chem, 2009:284(32):21369-78.

Ferrell R.F., Baty CJ, Kimak M.A., Karlsson J.M., Lawrence E.C., Franke-Snyder, M., Meriney S.D., Feingold, E., and Finegold, D.N. GJC2 Missense mutations cause human lymphedema. Am J Human Genetics 2010; 86: (6):943-8.

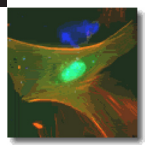
Alzamora R, Thali RF, Gong F, Smolak C, Li H, Baty CJ, Bertrand CA, Auchli Y, Brunisholz RA, Neumann D, Hallows KR, Pastor-Soler NM. PKA regulates vacuolar H+-ATPase localization and activity via direct phosphorylation of the A subunit in kidney cells. J Biol Chem 2010; 285(32):24676-85.

Ni HM, Baty CJ, Li N, Ding WX, Gao W, Li M, ChenX, Ma J, Michalopoulos GK, Yin XM. Bid agonist regulates murine hepatocyte proliferation by controlling endoplasmic reticulum calcium homeostasis. Hepatology. 2010;52(1):338-48.

Carol A. Bertrand, Ph.D.
Research Assistant Professor

Sun F, Mi Z, Condliffe SB, Bertrand CA, Gong X, Lu X, Zhang R, Latoche JD, Pilewski JM, Robbins PD, and Frizzell RA. (2008) Chaperone displacement from mutant cystic fibrosis transmembrane conductance regulator restores its function in human airway epithelia. FASEB J; 22(9):3255-63.

Kreindler JL, Bertrand CA, Lee RJ, Karasic T, Aujla S, Pilewski J, Frizzell R, and Kolls J. (2009)



Interleukin-17A induces bicarbonate secretion in normal human bronchial epithelial cells. Am J Physiol Lung Cell Mol Physiol, 296(2):L257-66.

Silvis MR, Bertrand CA, Ameen N, Golin-Bisello F, Butterworth MB, Frizzell RA, and Bradbury NA. (2009) Rab11b Regulates the Apical Recycling of CFTR in Polarized Intestinal Epithelial Cells. Mol Biol Cell, 20:2337-2350.

Bertrand CA, Zhang R, Pilewski J, and Frizzell R. (2009) SLC26A9 is a constitutively active, CFTR-regulated anion conductance in human bronchial epithelia. J Gen Physiol, 133(4):421-438.

Alzamora R, Thali RF, Gong F, Smolak C, Li H, Baty CJ, **Bertrand CA**, Auchli Y, Brunisholz RA, Neumann D, Hallows KR, and Pastor-Soler NM. PKA Regulates Vacuolar H^+-ATPase

Localization and Activity via Direct Phosphorylation of the A Subunit in Kidney Cells. J Biol Chem (2010), 285:24676.

Mo D, Potter BA, **Bertrand CA**, Hildebrand JD, Bruns JR, and Weisz OA. Nucleofection Disrupts Tight Junction Fence Function to Alter Membrane Polarity of Renal Epithelial Cells. Am J Phys (2010), doi:10.1152/ajprenal.00152.2010.

Michael Butterworth, Ph.D.
Assistant Professor

Butterworth, M.B.; Edinger, R.S.; Ovaa, H.; Johnson, J.P. and Frizzell, R.A. (2007). The deubiquitinating enzyme UCH-L3 regulates the apical membrane recycling of the epithelial sodium channel. *Journal of Biological Chemistry*. **282**:37885-93

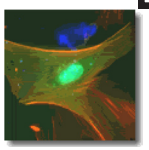
Hill, W.G.; Butterworth, M.B*.; Wang, H. Edinger, R.S.; Frizzell, R.A. and Johnson, J.P. (2007). Lipid rafts mediate constitutive apical delivery of the epithelial sodium channel (ENaC). *Journal of Biological Chemistry*. **282**:37402-11 (*Co-first author)

Liang, X.; Butterworth, M.B. ; Peters, K.W., Walker, W.H. and Frizzell, R.A. (2008). An obligatory heterodimer of 14-3-3β and 14-3-3ε is required for aldosterone regulation of the epithelial sodium channel. *Journal of Biological Chemistry.* **283:** 27418-27425

Hallows, K.R.; Edinger, R.S.; Butterworth, M.B.; Oyster, N.M.; Li, H.; Wang, H.; Buck, J.; Levin, L.R.; Johnson, J.P. and Pastor-Soler, N.M. (2009). Novel regulation of epithelial Na^+ transport by soluble adenylyl cyclase in kidney collecting duct cells. *Journal of Biological Chemistry.* **284(9):** 5774-83

Silvis, M.R.; Bertrand, C.A.; Ameen, N.; Golin-Bisello, F.; Butterworth, M.B., Frizzell, R.A. and Bradbury, N.A. (2009). Rab11b regulates the apical recycling of CFTR in polarized intestinal epithelial cells. *Mol.Biol.Cell*. **20(8):** 2337-50

Liang, X.; Peters, K.W.; Butterworth, M.B., Frizzell, R.A. (2010). AS160 modulates aldosterone stimulated epithelial sodium channel (ENaC) forward trafficking. Molecular Biology of the Cell. 21(12):2024-2033.



Daniel Devor, Ph.D.
Associate Professor

Nicolaou, S.A., L. Neumeier, Y. Peng, D.C. Devor and L. Conforti. The Ca^{2+}-activated K channel KCa3.1 compartmentalizes in the immunological synapse of human T lymphocytes. Am. J. Physiol. 292(4): C1431-C1439, 2007.

Jones, H.M., M.A. Bailey, C.J. Baty, G.G. MacGregor, C.A. Syme, K.L. Hamilton, and **D.C. Devor.** An NH_2-terminal multi-basic RKR motif is required for the ATP-dependent regulation of hIK1. Channels. 1(2): 80-91, 2007.

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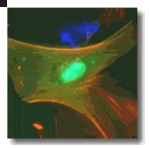

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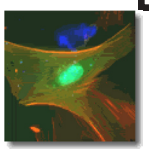

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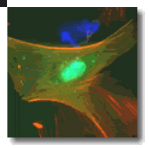

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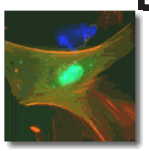

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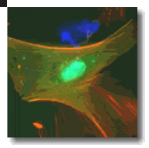

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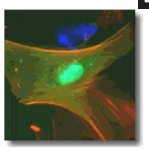

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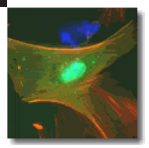

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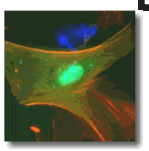

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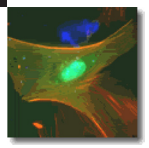

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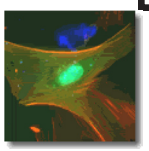

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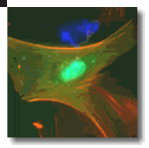

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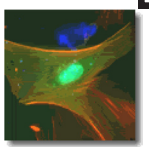

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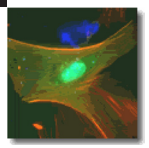

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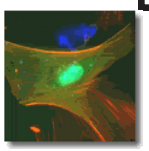

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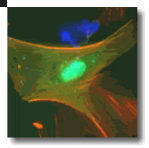

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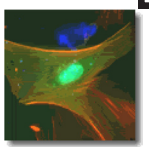

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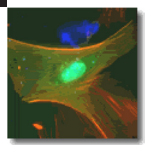

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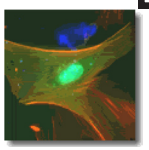

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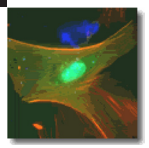

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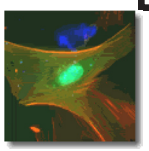

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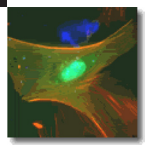

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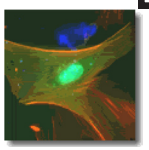

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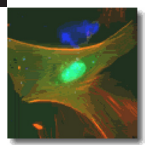

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Allan Zhao, Ph.D.
Associate Professor

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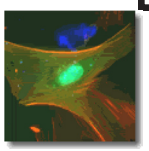
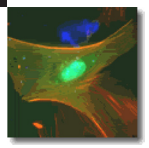


Executive Summary for the Cell Biology and Physiology FY2010 Business Plan

One of the key issues in the FY2011 Business Plan will be integration of the new chair for the department; Dr. Alexander Sorkin, and new recruit, Dr. Christine Wu, into the research, teaching and administrative activities of the Department. In the past fifteen years, the department has developed a diverse group of well funded investigators who contribute on many levels to the School of Medicine and its research and educational programs. Last year significant changes in the Department took place with seven members of the primary faculty leaving the Department. Achievement of the balanced distribution of the junior and senior faculty, and strong integration of all activities of the remaining faculty is an important topic of our FY2011 plan. This will be, in large part, achieved through the recruitment of one-two new faculty in the FY2011. We present the strengths, weaknesses, opportunities and threats to the success of the Department in its current configuration in this section of the Annual Report. This analysis incorporates also the implementation strategy of the current recruitment of a new faculty to the Department. We plan to recruit scientists who study fundamental aspects of cell biology and who can interface with our faculty, researchers in other departments in the School of Medicine and the entire Pittsburgh scientific community.

The outlook for the future of the Department is optimistic. New research themes and resources are integrated into the Department, which should lead to the overall increase in the research productivity and funding, new scientific interactions and development of new joint funding opportunities. There is also a strong confidence in continuing excellence of the established programs in the Department.

The Department's operating budget for fiscal year 2011 has been approved and is appended at the end of this analysis.



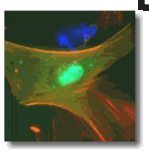
Strengths

Research

The Department of Cell Biology and Physiology has a strong research program aimed at addressing fundamental questions of cell biology, including mechanisms controlling membrane trafficking, cell polarity, signal transduction and cell cycle, transcription, intercellular interactions and channel regulation. The Faculty in the Department have made important contributions to these various areas of cell biology, and established themselves as leaders in their respective research fields. This is evident from recent publications in top tier cell biology journals such as the Journal of Cell Biology (Goh et al., 189:871-883; Long et al., 2010 190:115-128.) and the Molecular Biology of the Cell (Collette et al., 2009 20: 3401-3413; Duex and Sorkin, 2009 20: 1833-1844; Liang et al. 2010 21: 2024-2033; Silvis et al. 2009 20: 2337-2350). Membrane trafficking is a particular strength of the Department with research covering the entire spectrum of traffic-related issues from general mechanisms of protein and lipid trafficking, endocytosis and membrane organelle biogenesis, to cargo-specific mechanisms of anterograde and endocytic trafficking of receptors, transporters and channels. An example of the recognition and leadership of our faculty in the trafficking field is apparent in the content of a recent issue of Nature Reviews in Molecular and Cell Biology that was entirely dedicated to endocytosis. Among four full scholarly reviews in this issue, two were from the CBP Department, written by Drs. Traub and Sorkin. Furthermore, CBP faculty continue to present their research at international and national meetings, participate in NIH and other grant review panels and other organizational and service activities, all reflecting their influence in the respective research areas.

The majority of the CBP faculty continue to maintain active, funded research programs and have had remarkable success in obtaining new extramural research funding in the past cycle, as evidenced by the renewal of both the Cystic Fibrosis (Frizzell) and Networks and Pathways (Watkins) Center grants, and the competitive renewal of RO1 funding (Devor, Frizzell, Sorkin, Walker). Four senior faculty, Drs. Frizzell, Devor, Sorkin and Watkins, have multiple NIH grants. All three junior faculty, Drs. Butterworth, Hong and Thibodeau are now principal investigators on NIH funded grants. This is an impressive achievement in the current funding environment. Submission of new grant applications remains to be at high rate which ensures relative fiscal stability of the Department.

Two Centers associated with the Department represent particular strengths of the Department and the School. The Center for Biologic Imaging (CBI) is one of the largest imaging facilities in the country and provides state-of-the-art equipment and indispensible expertise in all types of cellular imaging to faculty of the Department and the entire School of Medicine. In the last year, the CBI was awarded multiple shared instrumentation grants from the NIH for live cell and confocal microscopes, which are essential to the continued growth of departmental infrastructure. The Center for Cystic Fibrosis is an example of a successful and well established program based on a coherent mix of the basic and translational science. Our faculty participates in NIH funded program projects (Fluorescent Probes and Imaging for Networks and Pathways; Center for HIV Protein Interactions; Molecular Biology of Hemorrhagic Shock) and is involved in multiple collaborations with basic science faculty and divisions of the Departments of Medicine and Pediatrics, as well as with the researchers at Carnegie Mellon University. Individual CBP Faculty hold major roles in organization of the annual “Local Traffic” symposium, running the Membrane Trafficking journal club and in various School committees.



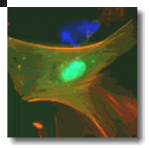
Teaching
Medical Curriculum: The department contributes extensively to the teaching of medical and graduate students in the School of Medicine. Our faculty has been actively participating in the remodeling of the first year curriculum, particularly in the area of biochemistry and cell biology, involving formal lectures in these areas and contributing to small group PBLs.

Graduate Curriculum: We now have 10 students in the graduate Ph.D. program in Cell Biology and Molecular Physiology. Thanks to the efforts of the program director, Dr. Walker, and newly formed CBMP program committee we were successful in attracting several new students to the program. Multiple students graduated in the last year, returning to medical school as MD/PhD students, or taking positions as postdoctoral fellows. In addition, CBP faculty participate in other graduate programs under umbrella of the Medical School Interdisciplinary Biomedical Graduate Program, as well as in the Departments of Bioengineering, Biological Sciences, Neurobiology among others.

Administration. There have been tremendous changes in the Department in the past year. The new chair, Dr. Sorkin, joined the Department on March 1, 2001. All of the committees in the Department have undergone restructuring. Vice-chair, Dr. Watkins, has assumed leadership in both the Promotion and Space committees, and also carries a significant amount of other administrative duties in helping Dr. Sorkin with the transition to his new administrative role. The administrative staff, headed by Susan Conway, has done an excellent job in providing various levels of support to the research, teaching and service activities. There have been additional and substantial loads placed on the administration due to extensive changes in the faculty and the associated transfer of multiple grants to and from the Department. The fact that this task was successfully accomplished in a timely and efficient manner attests to the experience and strength of our administrative staff.

Weaknesses
While not a problem at the present time, limited research space will likely become a weakness of the program in the future. There is presently unoccupied space in BST South due to the departures of Drs. Coyne and Zhao, and the relocation of Dr. Salama to Cardiology. However, this space may not be sufficient in order to recruit new faculty. In addition, more space will be required to allow for growth of the research programs of the current faculty located at BST South. Several of the CBP faculty members operate on different campuses. Dr. Frizzell's laboratory is located in the Children's Hospital in Lawrenceville, and Drs. Wan and Leuba are at the Hillman Cancer Center. There is clear separation from the rest of the Department leading to a lesser engagement of these three laboratories in the main activities of the Department at Oakland campus.

Opportunities
The vision of the new chair, and the leadership of the School, is to focus our research program towards basic cell biology and build a premier Department of Cell Biology. The key to accomplishing this task is the recruitment of focused and creative new faculty. The first new recruit will join the department in the fall of 2010. Dr. Christine Wu is cell biologist by education. She hopes to combine her interest in membrane proteomics and expertise in mass-spectrometry, with the existing expertise in cell biology and structure-function analysis of membrane proteins of faculty in the CBP Department. We plan to recruit three additional faculty whose research



programs focus on fundamental questions of cell biology. The importance of the successful recruitment of strong faculty to shape the future of the department, while achieving a healthy balance of junior and senior faculty members, is difficult to overemphasize.

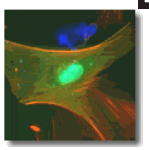
The influx of discretional funds with arrival of new chair have made it possible to re-vitalize important departmental activities that were stalled due to the lack of funding in the past. These functions include the annual departmental retreat and the weekly seminar series. There is also an opportunity to improve the departmental infrastructure including the needs for common equipment and a well designed web page. A new post-doctoral seminar series will allow better engagement of post-doctoral fellows in departmental activities, promote the establishment of new collaborations, and aid in preparing post-doctoral trainees to independent careers.

Threats

The steady decrease in federal and private funding opportunities will continue to be the most significant threat during next several years. Yet, in order for the Department to become one of the elite cell biology departments, total funding of the Department must increase 2-fold above the current level.

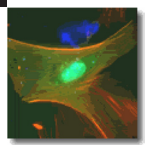
Another problem, though temporary, is the reduction in the number of the primary faculty in the Department, resulting in increased individual loads in service and teaching.

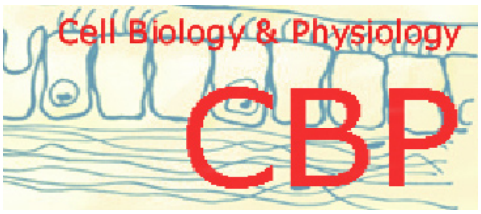
One of the biggest and difficult challenges we face is the strengthening of the Cell Biology and Molecular Physiology Graduate Program through the recruitment of top-tier students and provision of the best possible training environment in the laboratories of the Department. In this regard, a significant threat to student recruitment and training is the significant cost of maintaining graduate students in investigator laboratories at a time when research funding is in jeopardy.



Cell Biology and Physiology FY2010 Fiscal Issues

There are no serious budgetary issues that face the Department in the FY11 budget. Main efforts will be devoted to ensure that every primary faculty has sufficient external funding to support their research program, and that the departmental infrastructure continues to improve.





Thank you for your kind attention.