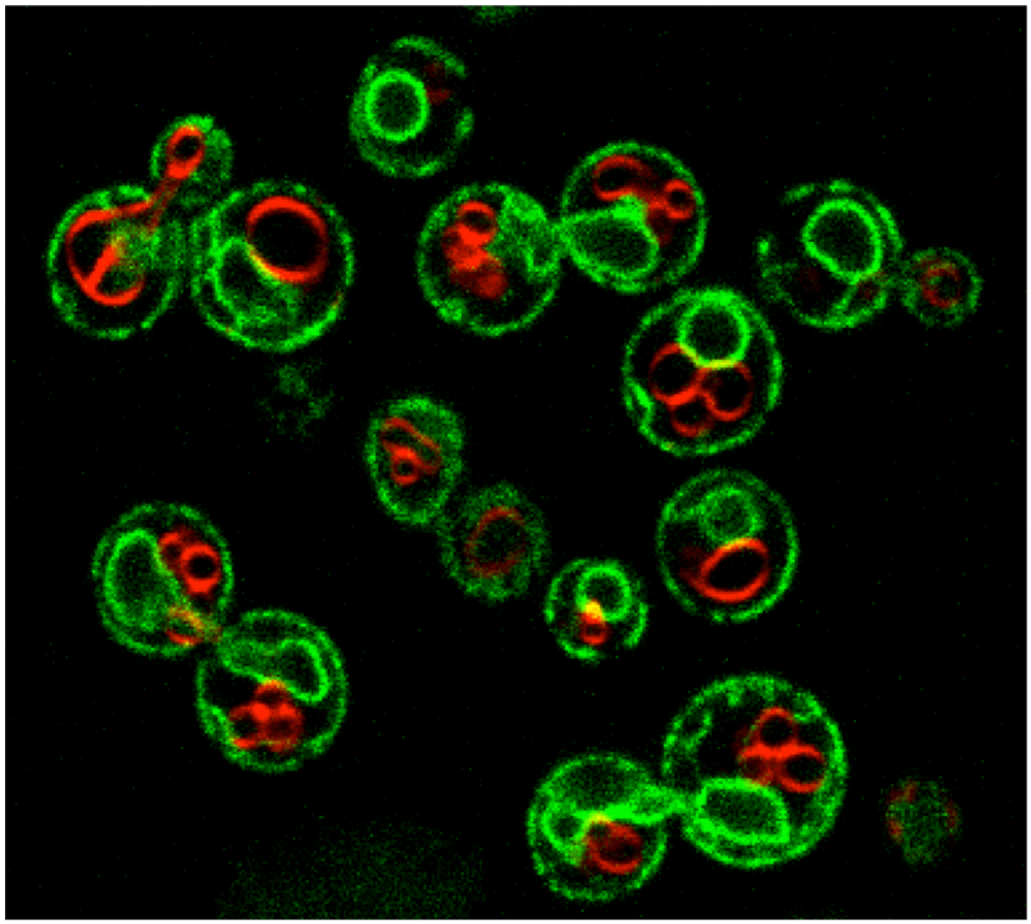
UNIVERSITY OF PITTSBURGH
SCHOOL OF MEDICINE

CELL BIOLOGY

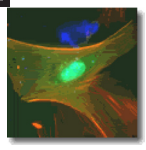


FY14 ANNUAL REPORT
AND
FY15 BUSINESS PLAN

Front Page

Cover figure by Dr. Marijn Ford. Vacuoles (red) and endoplasmic reticulum / nuclear envelopes (green) in yeast W303A cells. Vacuoles are highly dynamic and display significant morphological heterogeneity and form a variety of functionally important inter-organellar contacts. The yeast were grown in YPD.

Table of Contents of CB Annual Report



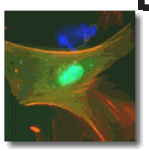
In the cell, life is governed by a multitude of molecular systems that shape and sustain the organellar system of the cell, maintain cellular homeostasis and respond to extracellular cues. These systems are dynamic, multicomponent macromolecular complexes. Maintaining and regulating the function of these 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 macromolecular machineries 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 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 yeast, fly, fish and mouse. The research in the Department involves translation of the fundamental cell functions to understanding the disease mechanisms and development of therapeutics.

The Department of Cell Biology 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 other Schools of the University of Pittsburgh and Carnegie-Mellon University. The Department is comprised currently of seventeen primary faculty with vigorous research programs. 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 ISB (Integrated Systems Biology) program, also HHMI-funded Computational Biology program, Center for Neuroscience Program (CNUP), the Program in Integrative Molecular Biology, and the Structural Biology/Molecular Biophysics graduate program. Several of our faculty are active members of these programs.

The Department is housed in administrative and research space in the South Wing of the Biomedical Science Tower (SBST). We also have laboratories in BST3, the Children's Hospital in Lawrenceville, 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. Marijn Ford

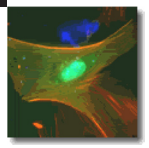
The dfocus of Ford's laboratory is on the structure-function analysis of dynamin-related proteins (DRP). DRP form a highly conserved family of large GTPases that performs diverse fundamental functions in membrane trafficking, organelle remodeling and membrane fusion and fission throughout the cell. Members of the family are found from bacteria to man. Dynamin, the most intensely studied member of the family, catalyzes the final scission step of vesicle budding



during endocytosis, in a mechanism dependent on its self-assembly and concerted stimulation of its GTPase activity. Close dynamin relatives do the same in mitochondrial division and other DRPs catalyze fusion by unknown mechanisms. The consequences of DRP dysfunction are a wide range of human pathologies, ranging from the syndromic disorders (e.g. certain subtypes of Charcot Marie Tooth) to the more generalized (diabetes and aging) and neurodegenerative disorders (Parkinson's). Additionally, some DRP family members have been implicated in innate broad-spectrum antiviral activity.

The research in Ford's laboratory aims at elucidating the molecular mechanisms by which DRP facilitates membrane remodeling, employing both structural and molecular genetic approaches. For example, new experimental approaches will be developed to stabilize members of the DRP family in a series of biologically relevant conformations to derive structural information to obtain insight into other mechanistically relevant conformations required for biological function – particularly how the construction required for scission may occur. Further, Dr. Ford will use yeast genetics and cell biological approaches to identify effectors involved in DRP function. Deeper understanding of the molecular cycle and binding partners of the DRPs, together with development for hypotheses as to how constriction is generated, will drive insight into diverse fundamental biological processes, from trafficking to cell division, in normal and disease settings.

Several images of the data from Ford lab are included with this report.



Research foci

Biomedical research in the Department of Cell Biology 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

Aridor
Butterworth
Devor
Ford
Frizzell
Murray
Sorkin
Traub
Watkins

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 underlying the organization of the cellular membrane compartment system, targeting of proteins and lipids to specific organelles and compartments, and at defining how these processes are disrupted in disease.

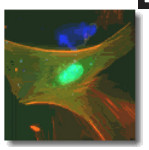
Regulation of channels and transporters

Butterworth
Devor
Sorkin
Thibodeau
Watkins

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

Hong
Kwiatkowski
Murray
Stoltz



Traub
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

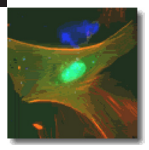
Drain
Leuba
Sorkin
Wan

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.

Mass-spectrometry and proteomics

Yates

This laboratory is focused on developing new methodologies of quantitative mass-spectrometric analyses of proteins including new approaches to data acquisition, analysis and storage.



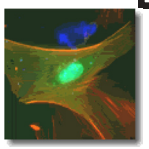
Center for Biologic Imaging

Over the last several years, microscopy as a scientific tool has reivented 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 few 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) super resolutions systems (SIM, STORM, PALM) electron microscopes 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, 2 multiphoton systems, a SIM system a STORM system, 6 high end upright microscopes and 3 electron microscopes (SEM and



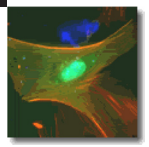
TEM). We also have multipe (30) online image processing work stations equipped with Metamorph, Elements, Imaris and Photoshop. Real time storage is 150 terabytes at gigabit speed and a half Petabyte tape library.

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 within the School of Medicine. His experience in microscopic methods covers most of the present light and electron microscopic methodologies.

The Associate Director: Dr. Donna Beer-Stolz is an Associate Professor in Cell Biology. 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.

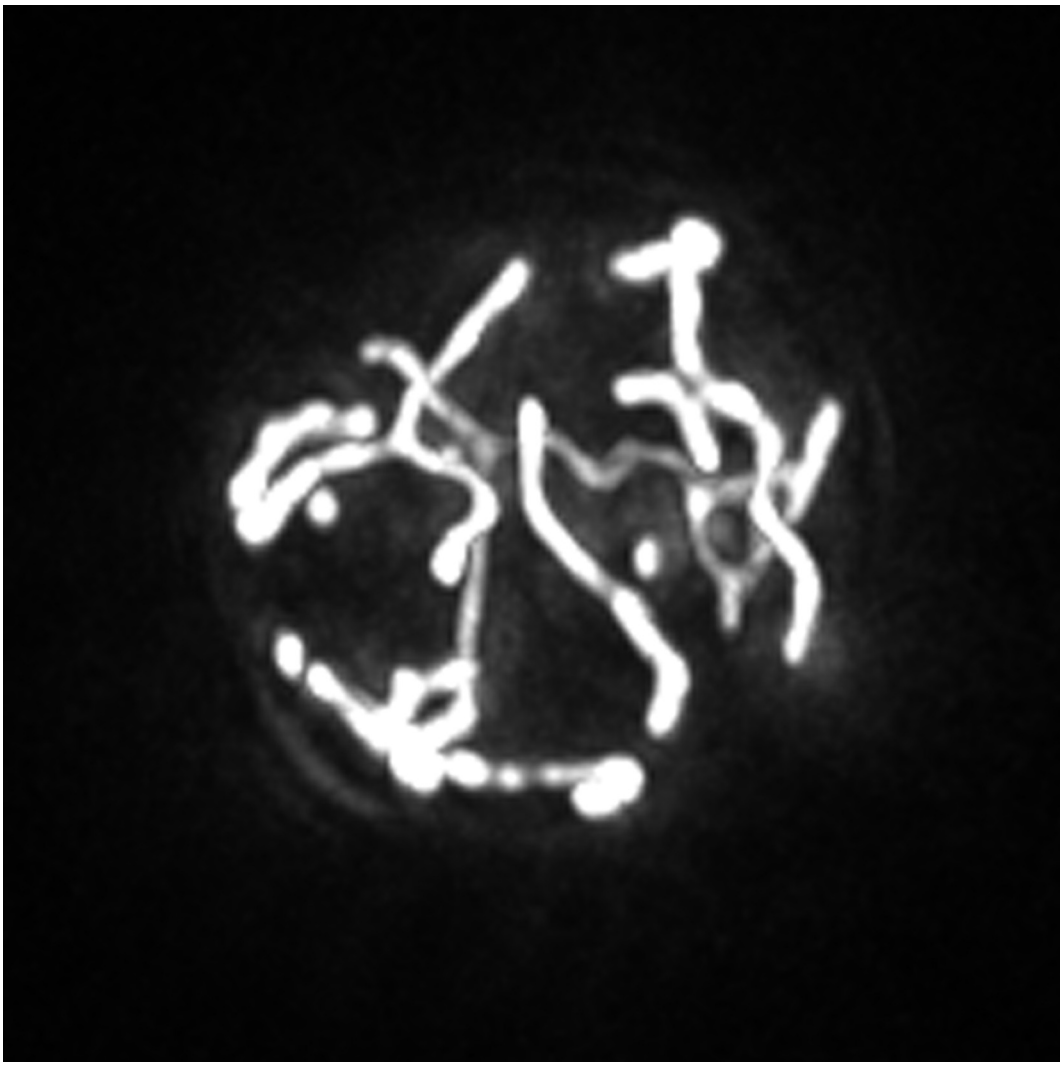
Other Faculty
Dr. Katy Baty is another faculty in the Center for Biologic Imaging as director of live cell imaging; her expertise is in cardiac myocytes and RNA trafficking within these cells. Another faculty who has become closely involved in the Center is Dr. Claudette St. Croix. Dr. St. Croix has 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 19 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,

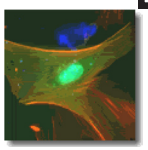


microscope maintenance, bookkeeping, solution preparation, etc.

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.



Marijn Ford. The mitochondrial network in yeast W303A cells, grown on YPEG. The mitochondria are cortical and reticular. The network is highly dynamic. Mitochondria undergo continuous rounds of fusion and fission, which relies on members of the dyamin-related protein family of large GTPases. The mitochondria were visualized by introduction of a fluorescent protein specifically targeted to the mitochondrial matrix.



Cystic Fibrosis Research Center

Center Director: *Dr. Raymond A. Frizzell*

History: The Cystic Fibrosis Foundation established a Research Development Program Center for research in cystic fibrosis in 1997. It was renewed in 2002 and 2007 and 2011. 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 lung transplant activity. The University of Pittsburgh RDP Center is one of nine such Centers supported by the CF Foundation in North America.

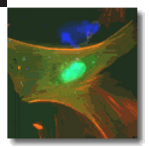
Funding: In 1998, this 'seed' funding from the CFF was supplemented by the award of NIH program funding in the form of a P50 SCOR. The P50 funding was renewed in the form of P30 Core Center grants in 2004 and 2010, each of which took decidedly more clinical turns. The latest P30 Core Center is entitled, "Basic and Clinical Studies of Cystic Fibrosis", and three such Centers were awarded nationally in the last funding round.

Structure: The primary goal of the CF Research Center is to focus the attention of new and established investigators on multidisciplinary approaches to improve the understanding and treatment of cystic fibrosis (CF), the most common lethal genetic disease among Caucasians. Thus, the CFRC supports pilot research projects and core facilities. The primary P30 award criterion was the presence of a significant research base of existing extramural grants, awarded to Center investigators, to justify its Research Cores. The current Center is a free-standing administrative unit and its primary cores are housed in the Rangos Research Center at the Children's Hospital of Pittsburgh, the Department of Cell Biology, Pulmonary Allergy and Critical Care Division of the Department of Medicine. The CFRC is directed by Raymond A. Frizzell, Ph.D., with extensive interactions with clinical colleagues and co-Directors, Joseph Pilewski, M.D. (Dept of Medicine) and Jay Kolls, M.D. (Dept of Pediatrics and Director, Richard King Mellon Foundation Institute for Pediatric Research).

Research: 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-causing 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 research. 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:

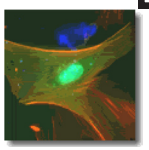
Human Airway Cell and Assays Core: This core provides access to patient materials obtained as a result of lung transplant activities in the Department of Surgery. This core offers well differentiated primary cultures of human bronchial epithelia to facilitate a variety of pre-clinical



research investigations. It has supplied cells to various academic and industrial investigators involved in CF research. This core also provides functional assays of CFTR and other proteins. Its assay menu includes fluorescence assays for anion permeability, transepithelial current and conductance in polarized airway or other epithelial cell cultures, both established cell lines and primary HBE cultures (above). Facilities and personnel for performing whole-cell and single channel patch clamp measurements are also available. The core also provides access to molecular reagents and techniques, to provide systems for gene expression, and standardized quality control. [Core Directors: Raymond A. Frizzell, Ph.D. and Joseph Pilewski, Departments of Cell Biology and Medicine]

Cell Imaging Core: This core is housed within the Center for Biologic Imaging of the Department of Cell Biology. It provides investigators within the Center 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 methods for measurements of airway surface liquid volume, ciliary beat frequency, muco-ciliary clearance, water permeability and the development of novel methods for detecting this low abundance protein at the cell surface, in collaboration with investigators at Carnegie Mellon University. [Core Director: Simon Watkins, Ph.D., Department of Cell Biology]

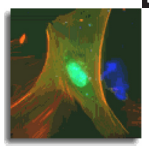
Clinical Studies Core: This core provides facilities and personnel for implementing clinical trials. It provides procedures for identifying functional outcomes, monitored in terms of lung function, *in vivo* radioisotope clearance, ion transport, inflammatory mediator levels or gene expression. It maintains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

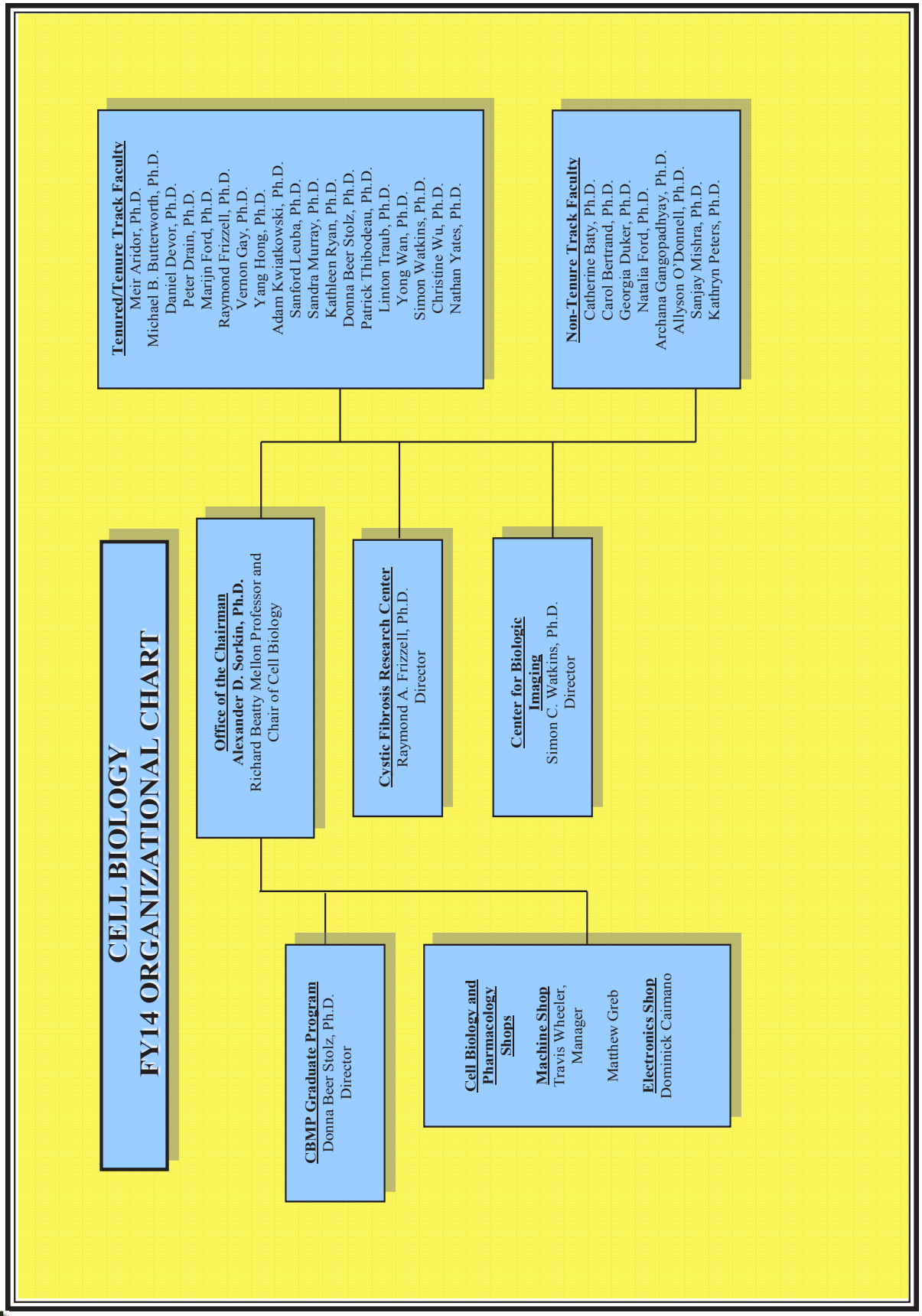


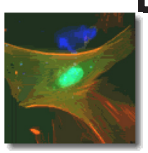
Cell Biology Faculty Data

[Current as of June, 2014]

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	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
Ford, Marijn	Assistant Professor	S326 BST-South Wing	marijn@pitt.edu	412-383-9025	412-648-8330
Ford, Natalia	Res. Asst. Professor	S355 BST-South Wing	nw@pitt.edu	412-383-9026	412-648-8330
Frizzell, Raymond	Professor	7117 RANCH	frizzell@pitt.edu	412-692-9449	412-692-9724
Gangopadhyay, Archana	Res. Asst. Professor	7161 RANCH	arg5@pitt.edu	412-692-9431	412-692-9724
Gay, Vernon	Associate Professor	S321 BST-South Wing	vlgay@pitt.edu	412-648-9422	412-781-8059
Hong, Yang	Associate Professor	S325 BST-South Wing	yhong@pitt.edu	412-648-2845	412-648-8330
Kwiatkowski, Adam	Assistant Professor	S324 BST-South Wing	adamkwi@pitt.edu	412-383-8139	412-648-8330
Leuba, Sanford	Associate Professor	2.26g Hillman Cancer Center	leuba@pitt.edu	412-623-7788	412-623-4840
Mishra, Sanjay	Res. Asst. Professor	7161 RANCH	skm25@pitt.edu	412-692-9331	412-692-9724
Murray, Sandra	Professor	S313 BST-South Wing	smurray@pitt.edu	412-648-9566	412-648-8330
O'Donnell, Allyson	Res. Asst. Professor	321 Langly Hall	allyod@pitt.edu	412-624-8147	412-648-8330
Peters, Kathryn	Res. Asst. Professor	7161 RANCH	kathi@pitt.edu	412-692-9336	412-692-9724
Ryan, Kathleen	Associate Professor	M302 Scaife Hall	ryankath@pitt.edu	412-648-8859	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
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
Wu, Christine	Associate Professor	S326 BST-South Wing	chriswu@pitt.edu	412-648-9260	412-648-8330
Yates, Nathan	Associate Professor	1719 BST3	yatesn@pitt.edu	732-718-9739	412-648-9009




CELL BIOLOGY
FY14 ORGANIZATIONAL CHART
Tenured/Tenure Track Faculty
Meir Aridor, Ph.D.
Michael B. Butterworth, Ph.D.
Daniel Devor, Ph.D.
Peter Drain, Ph.D.
Marijn Ford, Ph.D.
Raymond Frizzell, Ph.D.
Vernon Gay, Ph.D.
Yang Hong, Ph.D.
Adam Kwiatkowski, Ph.D.
Sanford Leuba, Ph.D.
Sandra Murray, Ph.D.
Kathleen Ryan, Ph.D.
Donna Beer Stolz, Ph.D.
Patrick Thibodeau, Ph.D.
Linton Traub, Ph.D.
Yong Wan, Ph.D.
Simon Watkins, Ph.D.
Christine Wu, Ph.D.
Nathan Yates, Ph.D.
Non-Tenure Track Faculty
Catherine Baty, Ph.D.
Carol Bertrand, Ph.D.
Georgia Duker, Ph.D.
Natalia Ford, Ph.D.
Archana Gangopadhyay, Ph.D.
Allyson O'Donnell, Ph.D.
Sanjay Mishra, Ph.D.
Kathryn Peters, Ph.D.
Office of the Chairman
Alexander D. Sorkin, Ph.D.
Richard Beatty Mellon Professor and Chair of Cell Biology
Cystic Fibrosis Research Center
Raymond A. Frizzell, Ph.D.
Director
Center for Biologic Imaging
Simon C. Watkins, Ph.D.
Director
CBMP Graduate Program
Donna Beer Stolz, Ph.D.
Director
Cell Biology and Pharmacology Shops
Machine Shop
Travis Wheeler, Manager
Matthew Greb
Electronics Shop
Dominick Caimano



Cell Biology
Research Seminar Schedule 2013 - 2014

September 17, 2013
Brian Harvey, Ph.D.
Director of Research, DOCTRID National Coordinator NBIP Ireland, Professor and Chair
Royal College of Surgeons, Ireland
"Estrogen and Epithelial Ion Transport: Rapid responses and physiological implications"

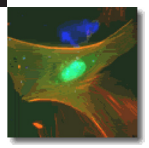
September 27, 2013
David G. Drubin, Ph.D.
Professor, Cell and Developmental Biology
University of California, Berkeley
"Spatiodynamics of Clathrin-Mediated Endocytosis in Yeast and Mammals"

October 15, 2013
Vann Bennett, M.D., Ph.D.
Professor, HHMI Investigator, Biochemistry
Duke University
"Micron-scale patterning of the fluid phospholipid bilayer: Mechanisms and Clinical Implications"

October 22, 2013
Stephanie Gupton, Ph.D.
Assistant Professor, Cell Biology & Physiology,
University of North Carolina, Chappel Hill
"TRIM9 coordinates membrane trafficking and cytoskeletal dynamics during neuronal development"

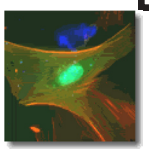
January 21, 2014
Timothy Sanders, M.D., Ph.D.
Assistant Professor, Richard King Mellon Foundation Institute
Children's Hospital of Pittsburgh
"Novel cellular mechanisms of patterning and signaling during early vertebrate embryogenesis"

March 18, 2014
Cun-Yu Wang, DDS, Ph.D.
Associate Dean of Graduate Studies, Chair, Oral Biology and Medicine
UCLA School of Dentistry
"Epigenetic Regulation of Squamous Carcinoma Cell Invasive Growth and Survival"



March 25, 2014
Nabil Seidah, Ph.D.
Director of the Laboratory of Biochemical Neuroendocrinology
Clinical Research Institute of Montreal
"Novel insights into the biology and pathophysiology of the proprotein convertases"

April 15, 2014
Rytis Prekeris, Ph.D.
Associate Professor, Cell and Developmental Biology
University of Colorado, Denver
"Many Lives of Endocytic Transport: From Cancer Cell Invasion to the Epithelial Cell Polarity"



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 that are being processed and sorted for vesicular transport in the ER. The development of a variety of human diseases, ranging from hemochromatosis, cystic fibrosis or hereditary emphysema to Pelizaeus-Merzbacher or ALS and Alzheimer's neurodegeneration can be derived from mistakes in ER sorting. Viruses such as coxsackie, polio, cytomegalovirus, HIV-1 Epstein-Barr and others manipulate sorting to self propagate and/or to evade immune surveillance.

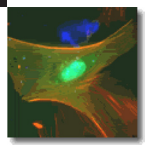
We take a multi disciplinary approach using a wide range of molecular, biochemical, biophysical and cellular techniques to unravel the molecular basis for protein and lipid sorting in the ER. Specifically, we use these approaches to address several related questions including the following: 1. What is the physical basis for membrane shaping and fission during ER exit? 2.What is the molecular basis for the assembly and organization of ER exit sites (ERES)? 3. How is the molecular machinery that organizes ERES regulated to couple ER sorting activities with physiological demands? 4. How are quality control activities in the ER coupled with cellular lipid homeostasis in normal and disease states?

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

Our laboratory studies 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. The breadth and significance of the roles of lymphatics in inflammation, immune response, metastasis, in addition to the generally accepted role of fluid transport, are beginning to be appreciated. 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 (e.g., women post breast cancer therapy).

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.



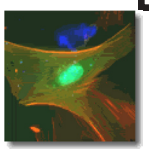
Michael B. Butterworth, Ph.D.
Assistant Professor

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.
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.

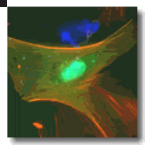
First, Mark Bailey, a graduate student in the lab, is carrying out patch-clamp studies designed to elucidate the role of S6 in the gating of KCa3.1. In these studies, we are employing PCMBS to probe the cysteines in S6 and evaluate their role in gating. PCMBS has advantages over MTS reagents in both 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 Ca^{2+} 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 Ca^{2+} 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 Ca^{2+} affinity. These results suggest this region of the channel is similarly involved in the coupling between Ca^{2+} 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 Ca^{2+} and gating.

Second, as any physiological response is dictated by not only the likelihood that channels are in the open state (P_o), 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



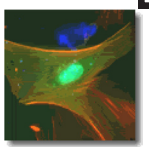
allow for the regulation of the number of channels present at the plasma membrane such that the physiological response to agonists may be modified.

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 Ca^{2+}-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



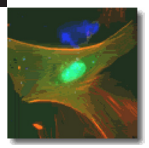
system. Cavita has also begun to culture cells from her transgenic line which will allow us to define cells expressing the transgene and characterize these *C. elegans* channels by patch-clamping. We can then determine whether mutations at conserved amino acids to those identified by us in mammalian channels will produce similar phenotypes, including increased Ca^{2+} 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 regulatory mechanisms underlying secretory vesicle cell biology in health and disease. Currently, the experimental focus is on the cell biology of mutations and binding partners of vesicle proteins that cause monogenic forms of diabetes and Parkinson's disease:

(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.

(3) More recently we have found that alpha-synuclein is expressed in pancreatic beta cells, where it localizes to secretory vesicles, in addition to its well established presence in dopaminergic and glutaminergic neurons of the brain. This has led to a new line of investigation studying the role of alpha-synuclein and how its interactions with other vesicle proteins changes under conditions of the stress leading to the hallmark degenerative cell biology that characterize these diseases.

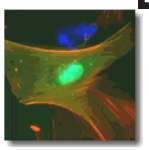
Trainees in our laboratory have the opportunity to combine the techniques of molecular genetics and confocal live-cell fluorescence imaging, with transgenic techniques to integrate understanding at the level of the molecule, organelle, whole cell, organ, and organism.

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, physiology workshops,designing and leading team-based learning 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 image collections now guide students through the renal, gastrointestinal, pulmonary, endocrine, musculoskeletal, reproductive and nervous systems. The entire image collection is available to students in the Histology Resource Room adjacent to my office. Here, Kodachromes, glass slides, projectors, multiheaded microscopes, computer to view electronic versions 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 2012, 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 nine 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.

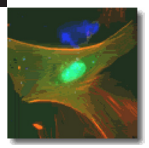
Marijn Ford, Ph.D.
Assistant Professor

The dynamin-related proteins (DRPs) are a family of highly conserved "large" GTPases whose members perform essential functions in membrane and organelle remodeling throughout the cell. All eukaryotes have several specialized DRPs that are responsible for membrane remodeling at specific membrane localizations, helping to maintain the dynamic nature of its endomembranes and organelles. The array of processes in which DRPs are involved includes membrane trafficking, mitochondrial dynamics and homeostasis, cytokinesis and innate cellular immunity, among others.

Our lab is interested in studying the molecular mechanisms of DRP-mediated membrane remodeling. To this end, the lab uses a range of techniques including high throughput genomics, imaging, biophysics and structural biology, with a special emphasis on Saccharomyces cerevisiae, the budding yeast.

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

Dr. Frizzell's interests concern the mechanisms of salt and water transport in secretory and absorptive epithelia and pathways that regulate 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. CFTR processing can be viewed as a 'bucket brigade' in which protein is passed from checkpoint to checkpoint and some is lost at each step. Therefore, it is important to know quantitatively the contribution of each step to the loss of CFTR protein so that the major one(s) can be targeted for drug development. Recently, we have described novel interactions of CFTR with chaperones called small heat shock proteins, which we have found to catalyze the addition of SUMO, a ubiquitin related modifier, to selectively target mutant CFTR for degradation. The selectivity of this pathway for mutant CFTR appears to extend also to misfolded proteins that lead also to neurodegenerative diseases, and the results implicate the components of this pathway as therapeutic targets for correcting mutant protein biogenesis. Finally, we have identified an alternative anion channel at the apical membranes of airway epithelial cells, and we are examining its contribution to salt and water secretion in the formation of airway surface liquid. This channel interacts tightly with CFTR, regulates its activity, and their interaction influences the biogenesis of both proteins. The activation of this channel could provide an alternative to CFTR for regulation of airway liquid properties.



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.

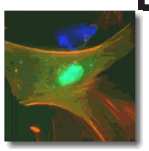
For his post-doctoral work Dr. Gay moved to the University of Michigan in Ann Arbor at a time when radio-immunoassays for gonadotropins (LH and FSH) were first available. In addition to describing hormone profiles throughout the reproductive cycle of the female rat, he was one of the first to describe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

Establishing cell polarity is essential for cellular morphogenesis,function and tissue integrity. Using Drosophila epithelial cells as amodel system, we aim to elucidate the fundamental mechanisms underlying the cell polarization by studying 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 first developed a novel genetic tool termed "genomic engineering" that allows targeted, 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. Taking advantage of the new and genetically validated fluorescent protein knock-in alleles of these key polarity proteins, a major research focus in the lab is to investigate the in vivo biosynthetic turnover and membrane redistribution dynamics of polarity proteins during apical-basal polarization. We are interested in elucidating how such dynamics regulates the polarity protein interactions to control the establishment and maintenance of apical-basal polarity. In addition, we recently discovered that cellular stresses directly regulate the subcellular relocalization process of certain polarity proteins, suggesting a previously



unknown mechanism by which these proteins control cellular survival and tumorigenesis.

Adam Kwiatkowski, Ph.D.
Assistant Professor

The regulated assembly and organization of specific actin networks drive cell morphology, movement and adhesion. Changes in cell behavior are required to form complex tissue structures during development and must be accompanied by transitions in actin organization. However, the molecular mechanisms governing actin network transitions are poorly understood. The goal of the lab is to understand how actin networks are assembled and organized to regulate cell morphology, movement and adhesion during development. We use a combination of protein biochemistry, cell biology, high-resolution microscopy and developmental biology to study actin dynamics at the molecular, cellular and organismal levels.

Sanford H. Leuba, Ph.D.
Associate Professor

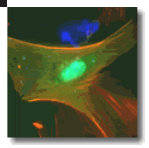
Since the discovery of the nucleosome in the early 1970's, scientists have sought to correlate chromatin structure and dynamics with biological function. More recently, we have learned that nucleosomes and chromatin play a critical role in the regulation of transcription, replication, recombination, 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.

- 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.

- 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.

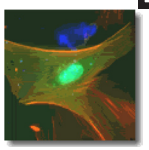
- We have used spFRET to demonstrate the wrapping of DNA around the archaeal homohexameric MCM helicase from Sulfolobus solfataricus (Graham et al., NAR 2011), protecting the displaced single-stranded DNA tail and preventing reannealing.

- In collaboration with Li Lan, Satoshi Nakajima and Vesna Rapic-Otrin (Molecular Genetics and Biochemistry), we have studied the ability of an E3 ligase to ubiquitinate histone H2a and destabilize nucleosomes with UV-damaged DNA (Li et al., JBC 2012).

- We have used spFRET to demonstrate that PcrA DNA helicase displaces RecA but not RecA mutants (Fagerburg et al., NAR 2012) indicating that direct transduction of chemomechanical forces alone by translocating helicases, such as PcrA and Srs2, are insufficient to displace recombinases such as RecA and Rad51 that form large polymeric assemblies on ssDNA.

- We have used spFRET, single molecule protein induced fluorescence enhancement (PIFE), fluorescence anisotropy and modeling to demonstrate for the first time that allosteric inhibitors directly alter the mobility of HIV-1 reverse transcriptase on its DNA substrate by modulating its conformation, without changing the binding affinity of RT to DNA (Schauer et al., 2014).

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

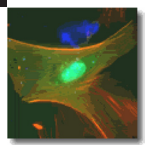
In Dr. Murray's laboratory integrated approaches are being used in studies to assess the role of gap junctions and cell-to-cell communication in endocrine cell proliferation, migration, differentiation, and hormone production and to elucidate the molecular machinery that regulates gap junction plaque endocytosis. Four different techniques (time-lapse video microscopy, immunocytochemistry, quantum dot immuno-electron microscopy, and western blot analysis) are being used to examine the role of clathrin and protein phosphorylation in gap junction protein (connexin) trafficking, including gap junction plaque assembly and subsequent internalization. The effect of over expression and inhibition of gap junctions on adrenal cell function, are being studied with cDNA antisense vectors, dominant-negative constructs, siRNA approaches, and antibody directed against gap junction genes products. Together these studies are designed to elucidate the role of cell-cell communication in tissue function with particular interest in how endocytosis and post-endocytic trafficking of gap junction proteins is regulated to control cellular function(s).

Allyson O'Donnell, Ph.D.
Research Assistant Professor

Nearly half of all prescription drugs alter G-protein coupled receptor (GPCR) signaling, including treatments for asthma, hypertension, neurodegenerative disorders and depression. β-arrestins are critical regulators of GPCRs: they act as trafficking adaptors to control GPCR endocytosis, impede G-protein signaling and are themselves therapeutic targets. However, β-arrestins are only a small branch of the larger arrestin family that includes the widely-conserved but functionally uncharacterized α-arrestins, the primary focus of my research. My work has shown that α-arrestins, like β-arrestins, regulate GPCR signaling, but also operate in unexpected trafficking pathways, including endosomal recycling and clathrin-independent endocytosis. Using *Saccharomyces cerevisiae* as a model, I've identified α-arrestin interactions with signaling regulators, cargos and vesicle coat proteins, and have begun to define the molecular mechanisms underlying α-arrestin-mediated trafficking. All of the α-arrestin-interacting partners identified in yeast are conserved. My research will apply insights gained in yeast to initiate studies on the relatively unstudied mammalian α-arrestins.

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

Cystic fibrosis is caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR); the most common is F508del which prevents CFTR from folding properly, from leaving the endoplasmic reticulum to assume residence in the apical plasma membrane, and from functioning in the cAMP regulated salt and water secretion in epithelial cells. We are identifying processes and proteins which modify any of a variety of mutant CFTRs and send it along ubiquitylation or SUMOylation pathways for degradation or biosynthesis. It is important in this endeavor to analyze not only the impact of overexpression but to ask ultimately whether the pathway under study is significant in primary cultures of human bronchial epithelial cells as concerns ubiquitin-dependent and -independent F508del degradation. To this end, we are evaluating the localization of proteins through subcellular fractionation to relate their expression to interactions with CFTR domains in the cytoplasm. For example, we are asking if the nuclear



SUMO regulator, PIAS4, is present also in the cytoplasm. As we identify other interactions, it will be necessary to validate their localization to authenticate their 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.

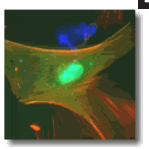
Alexander D. Sorkin, Ph.D.
Professor, Chairman of Department

The focus of the research in the laboratory is currently split into two major directions which are apparently distinct from each other with respect to the biological systems involved, their relation to the human disease, and experimental models used. However, the main idea underlying both directions is conceptually the same - to understand how endocytosis and post-endocytic trafficking regulate function(s) of the transmembrane proteins, such as receptors and transporters. One major project aims at elucidating the molecular mechanisms of endocytosis of growth factor receptors using a prototypic member of the family, epidermal growth factor (EGF) receptor, and analyzing the role of endocytosis in spatial and temporal regulation of signal transduction by the EGF receptor. Another major research direction is the study of the role of trafficking processes in the regulation of dopaminergic neurotransmission by the plasma membrane dopamine transporter (DAT). In both of these research areas we are using multidisciplinary methodological approach in *in vitro* and *in vivo* experimental models.

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 tissue 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 incompletely understood. 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. Additional research concentrations include vascular and parenchymal changes in liver and kidney with normal aging and in mouse models of accelerated aging.

Dr. Stolz is Associate Director of the Center for Biologic Imaging and directs the electron



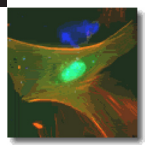
microscopy facility of CBI. Her main role as Associate Director of CBI is to facilitate PI usage with the facility, as well as assist in design, execution and interpretation of experiments involving all types of imaging technologies in general. Additionally, she coordinate interactions of PIs and students with other arms of the CBI, including widefield and confocal microscopy as well as live cell imaging. Dr. Stolz's research specialties involve vascular biology, liver regeneration and liver and kidney aging.

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

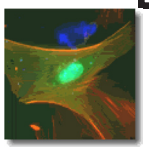
Posttranslational modifications such as ubiuqitylation, methylation, ADP-ribosylation as well as phosphorylation orchestrate genome stability, cell division, signal transduction, apoptosis and tumorigenesis. Posttranslational modifications act as critical molecular switches or fine-tune operators that determine the activation, deactivation or subcellular localization of functional proteins. Emerging evidence has drawn attention to the modulation of regulatory proteins in response to extrinsic/intrinsic signaling being executed simultaneously by multiple posttranslational modifications. Research interests in my laboratory seek to address how defects in the ubiquitin-proteasome system (E3 ligase/deubiquitinase), protein methyltransferase and poly (ADP-ribose) polymerase 1 (PARP1) would result in genomic instability, abnormal cell cycle or apoptosis, and aberrant signal transductions (e.g., ER, TGF-beta and EGFR) that predispose otherwise normal cells to become cancerous tumor cells. The ultimate objective is to integrate our basic research with clinical translational studies that would allow the development of new anti-cancer therapy thereby fully exploiting our knowledge of posttranslational modifications. To achieve our goals, we have developed a multidisciplinary approach that includes biochemical, cell biological and genetic analyses as well as the use of animal models and analyses of clinical samples.

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 behavior 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 develop novel imaging platforms for use in health and disease. Recent accomplishments have been the development of multiple new high speed high resolution imaging platforms for multidimensional imaging of model systems. We are now applying these tools to high speed imaging of the physiology and cell biology of the regulation of vascular tone in the Zebra fish

Christine Wu, Ph.D.
Associate Professor

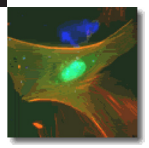
During the past decade, biological mass spectrometry has expanded into a mainstream and indispensable analytical field. My lab is focused on the development of proteomic methods and technology for the characterization and quantification of proteins using mass spectrometry. In particular, we are interested in developing optimized proteomic strategies compatible with the analysis of integral membrane proteins. Recent experimental strategies utilize the use of global



comparative bottom-up proteomic profiling (LC-MS/MS) followed by targeted hypothesis-driven strategies and the development of multiplexed SRM assays. These optimized workflows are then applied towards the identification of protein biomarkers of disease and the understanding of disease mechanisms (including breast cancer, liver disease, heart failure, and neural disorders).

Nathan Yates, Ph.D.
Associate Professor

The systematic goal motivating our work is to develop and apply powerful mass spectrometry based tools that represent a new "microscope" for studying biology and advancing efforts to understand and treat disease. By integrating mass spectrometry, automation, and informatics, we are developing new analytical tools for the characterization and quantification of complex biological systems. These –omics tools provide exciting opportunities to probe biology with absolute molecular specificity, however, significant hurdles must be cleared before they tools have widespread impact in basic and clinical research. A specific aim of our research is to develop distributed informatics tools and mass spectrometry data analysis techniques. Prior to joining the University of Pittsburgh, Dr. Yates' work at Merck & Co. Inc. led to the invention and eventual the commercialization of Differential Mass Spectrometry; an unbiased quantitative proteomics method for comparing complex biological systems. The lab is also focused on the development of innovative technologies that are designed to improve the throughput and reliability of quantitative proteomics assays. In collaboration with several industry partners, the lab is developing "easy to use" assay platforms that will enable scientists in basic and clinical research.



Study Sections (Fiscal Year 2013 - 2014)

Michael Butterworth, Ph.D.
Assistant Professor

2014 AHA (National)

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

ASIRC - Italian Association for Cancer Research; Standing Member
NIH/NCI PAR12-144 "Cancer Biology-2"
Association for International Cancer Research
NIH/NCI Omnibus Cancer Biology 3 ZCA1 RPRB-O (J1)

Yong Wan, Ph.D.
Associate Professor

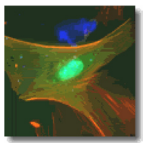
Molecular Oncogenesis Study Section (MONC), NIH

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

NIH study section UCSD P41 Panelist July 19th 2013
NIH study section S10 Electron Optics Chair of panel July 30th 2013
NIH study section 2014/01 ZAR1 XZ (M1) November 7th-8th 2013
Imaging Opportunities, Invited Speaker, Jacksonville Laureate society November 14th 2013
NIH study section 2014/01 ZDK1 GRB-8 (J1) December 6th panelist
Human Frontier Science Program Reviewer December 2013
ACS Study Section (Peer Review Committee on Clinical Cancer Research and Epidemiology), Chair of Panel, Atlanta, GA, Jan -21st-22nd, 2014
NIH Study section High End Instrumentation Panel, NIH, Chair of Panel March 18th 2014
Expert Review Committee: Mt Sinai Medical Center, Chair of Panel April 17th 2014
ACS Study Section (Peer Review Committee on Clinical Cancer Research and Epidemiology), Chair of Panel, Atlanta, GA, Jan -26th -27th 2014
NIH Study Section Exceptionally Innovative tools and Technologies for Single Cell Analysis ZRG1 BST-A(50)R. Panelist June 30th-July 1st 2014

Christine Wu, Ph.D.
Associate Professor

NIH/CSR EBIT Study Section 2010 – 2014 (4 year appointment)



Faculty Advisory Committee Memberships (Fiscal Year 2013 - 2014)

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 Space Committee
Cell Biology Faculty Recruitment Committee

Michael Butterworth, Ph.D.
Assistant Professor

Cell Biology Seminar Series
Cell Biology Departmental Retreat Committee
Cell Biology Space Committee
University of Pittsburgh: Senate Council Member
University of Pittsburgh: Faculty Assembly Member
Organizer – Cell Biology Department Retreat

Daniel Devor, Ph.D.
Professor

Cell Biology Departmental Tenure and Promotions Committee
Cell Biology Faculty Recruitment Committee
Chair, Interdisciplinary Biomedical Graduate Program Recruiting Committee

Peter F. Drain, Ph.D.
Associate Professor

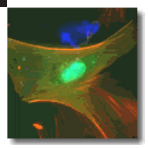
University of Pittsburgh School of Medicine Interdisciplinary Biomedical Graduate Program-
Cell Biology and Molecular Physiology Program Committee
Cell Biology Representative, Graduate Student Recruitment Committee
Scholarly Project Executive Committee Member
University of Pittsburgh School of Medicine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

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
FAST Advisor – First year medical students

Marijn Ford, Ph.D.
Assistant Professor

Organizer – Cell Biology Department Retreat



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

CFF Medical Advisory Council

Vernon L. Gay, Ph.D.
Associate Professor

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

Yang Hong, Ph.D.
Associate Professor

Director, Summer Undergraduate Research Program (SURP) in Cell Biology and Molecular Physiology
Cell Biology Space Committee

Adam Kwiatkowski, Ph.D.
Assistant Professor

Organizer – Cell Biology Department Retreat
Local Traffic Symposium Organizing Committee

Sanford Leuba, Ph.D.
Associate Professor

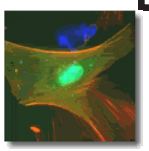
University Molecular Biophysics and Structural Biology Graduate Program Chair of Admissions Committee & Curriculum Committee

Allyson O'Donnell, Ph.D.
Assistant Professor

Undergraduate Research Committee, Department of Biological Science

Sandra A. Murray, Ph.D.
Professor

Graduate School of Public Health Research Advisory Committee – Center for Minority Health
Provost Advisory Committee for the Provost Development Fund Awards
Annual Biomedical Conference for Minority Students Advisory Committee
American Society for Cell Biology – Chair of the National Visiting Professor Program
American Association of Cell Biology Nominating Committee
Morehouse College of Medicine Advisory Board
Norfolk State University Center for Biotechnology and Biomedical Sciences
Cell Biology and Physiology Tenure and Promotions 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

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

Executive Committee – School of Medicine
University of Pittsburgh and Carnegie Mellon Medical Scientist Training Program Committee - MSTP
Center for Neuroscience University of Pittsburgh – CNUP
University of Pittsburgh Cell Biology and Molecular Physiology Program Committee
Cell Biology Tenure and Promotions Committee
Cell Biology Faculty Recruitment Committee
External Advisory Committee for Nevada's Cell Biology COBRE Grant, University of Nevada School of Medicine, Reno, NV

Donna Beer Stolz, Ph.D.
Associate Professor

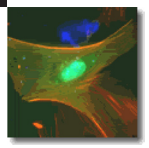
University of Pittsburgh School of Medicine Interdisciplinary Biomedical Graduate Program-Cell Biology and Molecular Physiology Program Admissions Committee
Director - Cell Biology and Molecular Physiology Program
Interdisciplinary Biomedical Graduate Program Admissions Committee Tour Guide

Patrick H. Thibodeau, Ph.D.
Assistant Professor

Associate Director, Cell Biology and Molecular Physiology Graduate Program
Member, Interdisciplinary Biomedical Graduate Program Steering Committee
Member, Cell Biology and Molecular Physiology Steering Committee
Interdisciplinary Biomedical Graduate Program admissions committee, ad hoc member
Interdisciplinary Biomedical Graduate Program admissions committee, CBMP representative

Linton M. Traub, Ph.D.
Associate Professor

University of Pittsburgh School of Medicine Health Sciences Research Advisory Committee



Cell Biology Tenure and Promotions Committee
Cell Biology Faculty Recruitment Committee
Cell Biology Space Committee
Planning Committee of Local Traffic Symposium on intracellular membrane traffic

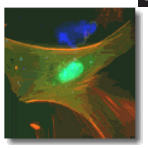
Simon C. Watkins, Ph.D.
Professor and Vice Chairman, Director of Center of Biologic Imaging

Cell Biology Tenure and Promotions Committee
Cell Biology Student Advisory Committee
Cell Biology Space Committee
Cell Biology 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: Roper Scientific

Christine Wu, Ph.D.
Associate Professor

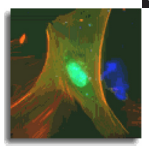
Cell Biology Faculty Recruitment Committee

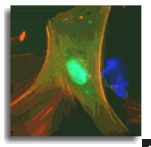
Cell Biology/Pharmacology Machine Shop



Cell Biology Sponsored Research Funding (FY14)

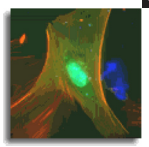
Name	Agency Name	Title	Annual DC	Annual IDC
Meir Aridor	National Institutes of Health	COPII Organization and Vesicle Formation at ER Exit Sites	120,619	62,120
Catherine Baty	CTSI	The Role of Placental Lymphatics in Preeclampsia and Intrauterine Growth Restriction	12,342	
Catherine Baty	NIH	IL-23 Stat3 drive oral immune responses to Candida albicans	3,815	2,013
Carol Bertrand	Cystic Fibrosis Foundation	Role of SLC26A9 in biogenesis and anion secretion in airway	90,000	7,200
Ethan Block	NIH-NRSA	Regulation of protein kinase c-mediated dopamine transporter endocytosis in vivo	26,971	-
Michael Butterworth	Gilead	Regulations of the epithelial sodium(ENaC)	60,185	4,815
Peter Drain	National Institutes of Health	Anesthetic Sites in Transmembrance Peptides by NMR	244	126
Peter Drain	JDRF	JDRF Live Alpha-Cell Glucagon Reporters Towardsa TID Cure	5,659	566
Raymond Frizzell	National Institutes of Health	Basic and Clinical Studies of Cystic Fibrosis - Administrative Core	44,513	22,926
Raymond Frizzell	National Institutes of Health	Basic and Clinical Studies of Cystic Fibrosis - Core A	139,841	72,018
Raymond Frizzell	Cystic Fibrosis Foundation	Program Enrichment and Administration Core	27,000	-
Raymond Frizzell	Cystic Fibrosis Foundation	Molecular Biology and Gene Expression Core A	100,000	-
Raymond Frizzell	Cystic Fibrosis Foundation	Research Training Core	70,000	-
Raymond Frizzell	Cystic Fibrosis Foundation	Selective Steps in WIld-Type and DF508 CFTR Processing	19,109	1,529
Raymond Frizzell	Cystic Fibrosis Foundation	Selective Steps in WIld-Type and DF508 CFTR Processing-Bridge Funding	14,390	1,151
Raymond Frizzell	Cystic Fibrosis Foundation	Selective Steps in WIld-Type and DF508 CFTR Processing	203,300	16,264
Raymond Frizzell	National Institutes of Health	Traffic Regulatory Proteins and ENaC	198,235	102,092
Raymond Frizzell	National Institutes of Health	Trans-NIH-Research Support	82,700	43,216
Raymond Frizzell	National Institutes of Health	Chaperone Actions in CFTR Biogenesis	55,625	29,788
Raymond Frizzell	National Institutes of Health	Role of the sHsp-SUMO pathway in APP processing Pilot 31-1	4,175	2,150
Raymond Frizzell	Cystic Fibrosis Foundation	Fluorogen detection of ASL composition and mucin secretion	15,030	1,202
Yang Hong	National Institutes of Health	Regulation of Adherens Junction Dynamics by Polarity Proteins	183,721	90,753
Yang Hong	American Cancer Society	Regulation of aTumor Suppressor and Cell Polarity Protein Lgl by Hypoxia	150,000	30,000
Adam Kwiatkowski	March of Dimes	Molecular coordination o f cell movement and cell-cell adhesion during neural tube formation	68,182	6,818
Sanford Leuba	National Institutes of Health	NNRTI induced conformational changes in HIV-1 RT	4,001	1,518
Sandra Murray	National Science Foundation	Gap Junction Plaque Internalization	110,602	50,422
Sandra Murray	National Science Foundation	Gap Junction Plaque Internalization	13,334	3,334
Sandra Murray	National Institutes of Health	National Institute of Mentoring Early Minority Faculty in Neuroscience	1,720	138
U. Perunthottathu	American Heart	Mechanistic Role of Clathrin Endocytic Component, Fcho1 in Bmp Signaling (Postdoc Fellow-ship)	48,000	-

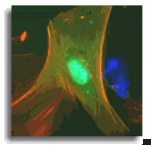




Alexander Sorkin	National Institutes of Health	The influence of gene-environment interactions on neuronal mitchondrial fission, fusion, and transport in chronic parkinson's disease-relevane environmental toxin models.	6,642	3,487
Alexander Sorkin	National Institutes of Health	Dopamine Transporter Regulation by Endocytosis	225,292	104,371
Alexander Sorkin	National Institutes of Health	Pathogenesis of Cancer - Role of EGF Receptor Endocytosis	224,711	91,111
Donna Beer Stolz	Massachusetts Institute of Technology	Perfused 3D Tissue Surrogates for Complex Cell-Cell Communication Systems	41,325	21,282
Donna Beer Stolz	National Institutes of Health	Ex Vivo Adipose Tissue as a Screening Tool	1,102	568
Donna Beer Stolz	National Institutes of Health	Endogenous Regulators of Inflammation in Liver Ischemia/Reperfusion	10,705	5,531
Donna Beer Stolz	National Science Foundation	Engineering Research Center	24,346	12,593
Donna Beer Stolz	National Institutes of Health	Core A Cell and tissue Imaging Core	12,375	6,497
Donna Beer Stolz	National Institutes of Health	Core A Cell and tissue Imaging Core	62,326	30,241
Donna Beer Stolz	National Institutes of Health	All Human Microphysical Model of Metastasis Therapy	87,780	40,834
Donna Beer Stolz	MWRI-NIH	Primary Human Trophoblasts and the Transfer of Viral Resistance	10,009	5,154
Donna Beer Stolz	National Institutes of Health	Bid-mediated killing of oncogenic stem cells in chemoprevention	3,875	2,047
Donna Beer Stolz	VUMC	Arginine/NO metabolism in HCC	20,144	
Donna Beer Stolz	National Institutes of Health	Mechanisms of Arsenic-induced Muscle Morbidity and Reduced Regenerative Capacity	8,089	4,296
Donna Beer Stolz	National Institutes of Health	Studying the role of the nuclear lamina in age dependent	1,764	926
Donna Beer Stolz	National Institutes of Health	Signaling pathways influencing liver disease phenotype in antitrypsin deficiency	14,351	7,642
Donna Beer Stolz	National Institutes of Health	Joel Freeze Fracture/Freeze Etch Device	318,190	-
Donna Beer Stolz	National Institutes of Health	Proteotoxicity in the Pathophysiology of Pancreatitis	1,250	670
Donna Beer Stolz	National Institutes of Health	Nitrix Oxide and Hepatic Function in Sepsis and Trauma	2,669	901
Patrick Thibodeau	National Institutes of Health	Regulated Biosynthesis and Function of ABC-Transport Systems	250,000	128,749
Patrick Thibodeau	Cystic Fibrosis Foundation	Structural Interactions Regulating CFTR Channel Function-BRIDGE FUNDING	10,803	864
Patrick Thibodeau	Cystic Fibrosis Foundation	Structural Interactions Regulating CFTR Channel Function	53,991	4,319
Linton Traub	National Institutes of Health	Clatherin-coated vesicles and endocytic function	316,445	154,446
Simon Watkins	Cystic Fibrosis Foundation	Research Development Project - Imaging Core	40,000	-
Simon Watkins	National Institutes of Health	University of Pittsburgh Center for HIV Protein Interactions (PCHPI)	6,669	3,434
Simon Watkins	National Institutes of Health	University of Pittsburgh Center for HIV Protein Interactions (PCHPI)	73,679	37,944
Simon Watkins	National Institutes of Health	Pittsburgh Center for Kidney Research	1,883	970
Simon Watkins	National Institutes of Health	Pittsburgh Center for Kidney Research	13,755	7,238
Simon Watkins	National Institutes of Health	Intracellular Serpin Regulation of Intestinal Cell Necrosis	370	190
Simon Watkins	National Institutes of Health	Molecular Biology of Hemorrhagic Shock	91,258	39,927
Simon Watkins	National Institutes of Health	Directing Tumor Specific T cells to Tumors	25,512	13,139
Simon Watkins	National Institutes of Health	Amplification of IL-4Ralpha Signaling Pathways in Human Airways Through 15 LO1	5,752	2,962

Simon Watkins	National Institutes of Health	Multiple Tumor Antigen-Loaded DC Vaccine for Hepatocellular Cancer	6,682	3,442
Simon Watkins	National Institutes of Health	Cancer Center Support Grant	81,832	42,143
Simon Watkins	National Institutes of Health	Basic and Clinical Studies of Cystic Fibrosis - Core C	84,014	37,329
Simon Watkins	Mellon Pitt Corporation	Fluorescent Probes and Imaging for Networks and Pathways	150,000	69,524
Simon Watkins	National Institutes of Health	DNA Damage Recognition by Nucleotide Excision Repair Proteins	8,620	4,438
Simon Watkins	National Institutes of Health	Adipose Triglyceride Lipases (ATGL) in Liptoxicity and the Metabolic Syndrome	5,000	2,575
Simon Watkins	National Institutes of Health	Stem Cells for Corneal Engineering	19,364	8,814
Simon Watkins	National Institutes of Health	ROS Mechanisms in BAV Aortopathy	5,402	2,774
Simon Watkins	National Institutes of Health	Vascular Subphenotypes of Lung Disease - Core B	5,490	1,842
Simon Watkins	National Institutes of Health	Vascular Subphenotypes of Lung Disease - Project 1	12,225	4,816
Simon Watkins	National Institutes of Health	PINK1 Regulation of Neuronal and Mitochondrial Homeostasis	4,000	2,060
Simon Watkins	Army	Human Hepatocytes for Treatment of Life-Threatening Liver Injury	5,844	3,010
Simon Watkins	National Institutes of Health	Imaging Mass Spectrometry for Oxidized Lipidomics in Acute Lung Injury	12,090	4,085
Simon Watkins	National Institutes of Health	Mapping Lipid Oxidation in Traumatic Brain Injury by Mass Spectrometric Imaging	10,892	5,609
Simon Watkins	National Institutes of Health	Combinatioal Immunotherapy targeting the Malonoma	21,463	9,956
Simon Watkins	National Institutes of Health	Cell Autonomous and Non-Autonomous Mechanisms of Again	109,961	52,480
Simon Watkins	National Institutes of Health	Targeted Fluorescent Indicators for Endothelial Physiology	24,651	7,271
Simon Watkins	National Institutes of Health	Biochemical and Spatial Regulation of IKKa/NEMO During T-Cell Activation	10,470	5,509
Simon Watkins	National Institutes of Health	Cardiolipin as a Novel Mediator of Acute Lung Injury	104,312	55,024
Simon Watkins	National Institutes of Health	CYP 450 Mediated CBF Dysregulation and Neurotoxicity in Pediatric Cardiac Arrest	8,450	3,632
Simon Watkins	National Institutes of Health	Request for a Structured Illumination Super-Resolution Microscope	600,000	-
Simon Watkins	National Institutes of Health	Request for Transmission Electron Microscope for the University of Pittsburgh (S10)	459,000	-
Simon Watkins	National Institutes of Health	The Link Between hemodynamics and Wall Structure in Cerebral aneurysms	8,382	3,416
Simon Watkins	National Institutes of Health	PQC2 Alteration of 3D nuclear organization at nanoscale in breast tumorigenesis	1,452	780
Simon Watkins	National Institutes of Health	Aurora B-induced cytokinasis defects in malignant cells	6,680	-
Nathan Yates	National Institutes of Health	Cell Autonomous and Non-Autonomous Mechanism of Aging	141,301	47,933
Nathan Yates	National Institutes of Health	Plasticity of Auditory Cortical Circuits in Schizophrenia	2,787	1,495
Nathan Yates	National Institutes of Health	Bioengineering Tracheas through Targeting Activated Cell	4,473	2,415
			5,755,212	1,666,864

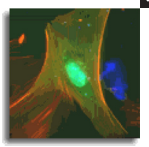


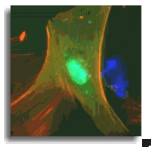


Cell Biology Sponsored Research Funding (FY15)

Name	Agency Name	Title	Annual DC	Annual IDC
Catherine Baty	National Institutes of Health	IL-23 Stat3 drive oral immune responses to Candida albicans	765	403
Catherine Baty	National Institutes of Health	Apical protein sorting in renal epethelial cells	4801	2593
Carol Bertrand	Cystic Fibrosis Foundation	Role of SLC26A9 in biogenesis and anion secretion in airway	67500	5400
Ethan Block	National Institutes of Health	Regulation of protein kinase c-mediated dopamine transporter endocytosis in vivo	26971	0
Michael Butterworth	Gilead	Regulation of the Epithelial Sodium (ENAC) in the Cystic Fibrosis Airway by Pseudomonas Eruginosa	60185	4815
Michael Butterworth	American Society for Nephrology	Aldosterone-Regulated microRNAs and sodium transport in distal kidney nephron	90909	9091
Peter Drain	JDRF	JDRF Live Alpha-Cell Glucagon Reporters Towardsa TID Cure	62,523	6,252
Raymond Frizzell	National Institutes of Health	Basic and Clinical Studies of Cystic Fibrosis - Administrative Core	41503	21373
Raymond Frizzell	National Institutes of Health	Basic and Clinical Studies of Cystic Fibrosis - Core A	128233	70755
Raymond Frizzell	Cystic Fibrosis Foundation	Program Enrichment and Administration Core	27,000	0
Raymond Frizzell	Cystic Fibrosis Foundation	Molecular Biology and Gene Expression Core A	100000	0
Raymond Frizzell	Cystic Fibrosis Foundation	Research Training Core	70,000	0
Raymond Frizzell	Cystic Fibrosis Foundation	Selective Steps in WIld-Type and DF508 CFTR Processing	38450	3076
Raymond Frizzell	Cystic Fibrosis Foundation	Selective Steps in WIld-Type and DF508 CFTR Processing	192018	15361
Raymond Frizzell	National Institutes of Health	Traffic Regulatory Proteins and ENaC	16454	8474
Raymond Frizzell	National Institutes of Health	Trans-NIH-Research Support	4148	2178
Raymond Frizzell	National Institutes of Health	Chaperone Actions in CFTR Biogenesis	222500	119403
Raymond Frizzell	National Institutes of Health	Role of the sHsp-SUMO pathway in APP processing Pilot 31-1	20825	10724
Raymond Frizzell	Cystic Fibrosis Foundation	Fluorogen detection of ASL composition and mucin secretion	74970	5998
Yang Hong	National Institutes of Health	Regulation of Adherens Junction Dynamics by Polarity Proteins	137550	27510
Yang Hong	American Cancer Society	Regulation of aTumor Suppressor and Cell Polarity Protein Lgl by Hypoxia	166133	85559
Adam Kwiatkowski	March of Dimes	Molecular coordination o f cell movement and cell-cell adhesion during neural tube formation	39750	3975
Sanford Leuba	National Institutes of Health	NNRTI Induced Conformational Changes in HIV 1 RT - Subaccount Sluis-Cremer	63443	27574
Sandra Murray	National Science Foundation	Gap Junction Plaque Internalization	46121	21026
Sandra Murray	National Science Foundation	Gap Junction Plaque Internalization	8340	2085
Sandra Murray	National Institutes of Health	National Institute of Mentoring Early Minority Faculty in Neuroscience	3485	279
U. Perunthottathu	American Heart	Mechanistic Role of Clathrin Endocytic Component, Fcho1 in Bmp Signaling (Fellowship)	24000	0
Alexander Sorkin	National Institutes of Health	The influence of gene-environment interactions on neuronal mitchondrial fission, fusion, and transport in chronic parkinson's disease-relevane environmental toxin models.	3354	1811
Alexander Sorkin	National Institutes of Health	Dopamine Transporter Regulation by Endocytosis	227214	111436

Alexander Sorkin	National Institutes of Health	Pathogenesis of Cancer - Role of EGF Receptor Endocytosis	228539	99580
Donna Beer Stolz	Massachusetts Institute of Technology	Perfused 3D Tissue Surrogates for Complex Cell-Cell Communication Systems	6891	3549
Donna Beer Stolz	National Institutes of Health	Endogenous Regulators of Inflammaion in Liver Ischemia/Reperfusion	10731	5525
Donna Beer Stolz	National Science Foundation	Engineering Research Center	23916	12317
Donna Beer Stolz	National Institutes of Health	Core A Cell and tissue Imaging Core	71,946	38,166
Donna Beer Stolz	National Institutes of Health	All Human Microphysical Model of Metastasis Therapy	87,780	40,834
Donna Beer Stolz	MWRI-NIH	Primary Human Trophoblasts and the Transfer of Viral Resistance	7,349	3,785
Donna Beer Stolz	National Institutes of Health	Bid-mediated killing of oncogenic stem cells in chemoprevention	4,700	2,525
Donna Beer Stolz	National Institutes of Health	Mechanisms of Arsenic-induced Muscle Morbidity and Reduced Regenerative Capacity	13,875	7,313
Donna Beer Stolz	National Institutes of Health	Local Expression of Alpha-1-Antitrypsin in Emphysema (Perlmutter)	2,372	1,281
Donna Beer Stolz	National Institutes of Health	Signaling pathways influencing liver disease phenotype in antitrypsin deficiency	31,175	16,051
Donna Beer Stolz	National Institutes of Health	Proteotoxicity in the Pathophysiology of Pancreatitis	5,000	2,680
Donna Beer Stolz	National Institutes of Health	Nitrix Oxide and Hepatic Function in Sepsis and Trauma	10826	4015
Patrick Thibodeau	National Institutes of Health	Regulated Biosynthesis and Function of ABC-Transport Systems	250,000	128,749
Patrick Thibodeau	Cystic Fibrosis Foundation	Structural Interactions Regulating CFTR Channel Function	54,056	4,324
Linton Traub	National Institutes of Health	Clatherin-coated vesicles and endocytic function	233,970	123,681
Linton Traub	National Institutes of Health	Admin Supplement - Clatherin-coated vesicles and endocytic function	12,965	0
Simon Watkins	Cystic Fibrosis Foundation	Research Development Project - Imaging Core	40,000	0
Simon Watkins	National Institutes of Health	University of Pittsburgh Center for HIV Protein Interactions (PCHPI)	80,348	41,379
Simon Watkins	National Institutes of Health	Pittsburgh Center for Kidney Research	15,000	7,092
Simon Watkins	National Institutes of Health	Amplification of IL-4Ralpha Signaling Pathways in Human Airways Through 15 LO1	6,133	3,159
Simon Watkins	National Institutes of Health	Multiple Tumor Antigen-Loaded DC Vaccine for Hepatocellular Cancer	6155	3170
Simon Watkins	National Institutes of Health	Cancer Center Support Grant	82,026	42,244
Simon Watkins	National Institutes of Health	Basic and Clinical Studies of Cystic Fibrosis - Core C	79,154	35,170
Simon Watkins	National Institutes of Health	Directing Tumor Specific T cells to Tumors	6527	3362
Simon Watkins	Mellon Pitt Corporation	Fluorescent Probes and Imaging for Networks and Pathways	12450	5770
Simon Watkins	National Institutes of Health	DNA Damage Recognition by Nucleotide Excision Repair Proteins	8,725	4,492
Simon Watkins	National Institutes of Health	Adipose Triglyceride Lipases (ATGL) in Liptoxicity and the Metabolic Syndrome	5,000	2575
Simon Watkins	National Institutes of Health	Stem Cells for Corneal Engineering	20,634	9,083
Simon Watkins	National Institutes of Health	ROS Mechanisms in BAV Aortopathy	5,801	1,987
Simon Watkins	National Institutes of Health	Vascular Subphenotypes of Lung Disease - Core B	5,799	1,981
Simon Watkins	National Institutes of Health	Vascular Subphenotypes of Lung Disease - Project 1	12,519	5,199
Simon Watkins	National Institutes of Health	PINK1 Regulation of Neuronal and Mitochondrial Homeostasis	4,000	2,060





Simon Watkins	National Institutes of Health	Mapping Lipid Oxidation in Traumatic Brain Injury by Mass Spectrometric Imaging	10,892	5,609
Simon Watkins	National Institutes of Health	Combinatioal Immunotherapy targeting the Malonoma	22,406	10,389
Simon Watkins	National Institutes of Health	Cell Autonomous and Non-Autonomous Mechanisms of Again	107,504	52,652
Simon Watkins	National Institutes of Health	Targeted Fluorescent Indicators for Endothelial Physiology	24,651	7,271
Simon Watkins	National Institutes of Health	Biochemical and Spatial Regulation of IKKa/NEMO During T-Cell Activation	11,121	5,980
Simon Watkins	National Institutes of Health	Cardiolipin as a Novel Mediator of Acute Lung Injury	125,225	66,056
Simon Watkins	National Institutes of Health	CYP 450 Mediated CBF Dysregulation and Neurotoxicity in Pediatric Cardiac Arrest	10,000	4,511
Simon Watkins	National Institutes of Health	Watkins/Saunders Aurura B-induced cytokinesis defects in malignant cells	13,340	-
Simon Watkins	National Institutes of Health	PQC2 Alteration of 3D nuclear organization at nanoscale in breast tumorigenesis	8,697	4,673
Simon Watkins	National Institutes of Health	Mechanisms of Perineural Invastion in head an neck cancer	10,000	5,400
Simon Watkins	National Institutes of Health	Mechanisms of Perneural Invasion in head and Neck cancer	5,006	1,207
Nathan Yates	National Institutes of Health	Cell Autonomous and Non-Autonomous Mechanism of Aging	140,411	48,822
Nathan Yates	National Institutes of Health	Plasticity of Auditory Cortical Circuits in Schizophrenia	11,151	5,977
Nathan Yates	National Institutes of Health	Bioengineering Tracheas through Targeting Activated Cell	13,891	9,685
Nathan Yates	National Institutes of Health	Request for triple quadrupole mass spectrometer for the University of Pittsburgh	487,268	-
			4,417,070	1,458,481

Faculty Editorships (Fiscal Year 2013 - 2014)

Michael B. Butterworth, Ph.D.
Assistant Professor

American Journal of Physiology – Renal Physiology
Frontiers in Renal and Epithelial Physiology
PLoS ONE

Vernon Gay, Ph.D.
Associate Professor

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

Adam Kwiatkowski, Ph.D.
Assistant Professor

Associate Editor, BMC Cell Biology

Sanford Leuba, Ph.D.
Associate Professor

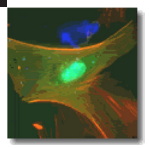
Section Editor, Biomed Central Biophysics

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

Molecular Biology of the Cell – Reviewing Editorial Board
Traffic, Associate Editor
Scientific Reports Editorial Board

Donna Beer Stolz, Ph.D.
Associate Professor

Editorial Board: Cell Transplantation: The Regenerative Medicine Journal. Hepatocyte section.



Linton Traub, Ph.D.
Associate Professor

Member of editorial board of Traffic
Member of editorial board of Cellular Logistics
Member of editorial board of Scientific Reports
Member of editorial board of The Journal of Biological Chemistry
Member of board of reviewing editors, Molecular Biology of the Cell

Yong Wan, Ph.D.
Associate Professor

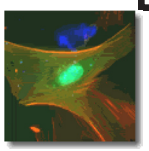
Member, Editorial Board, Journal of Biological Chemistry

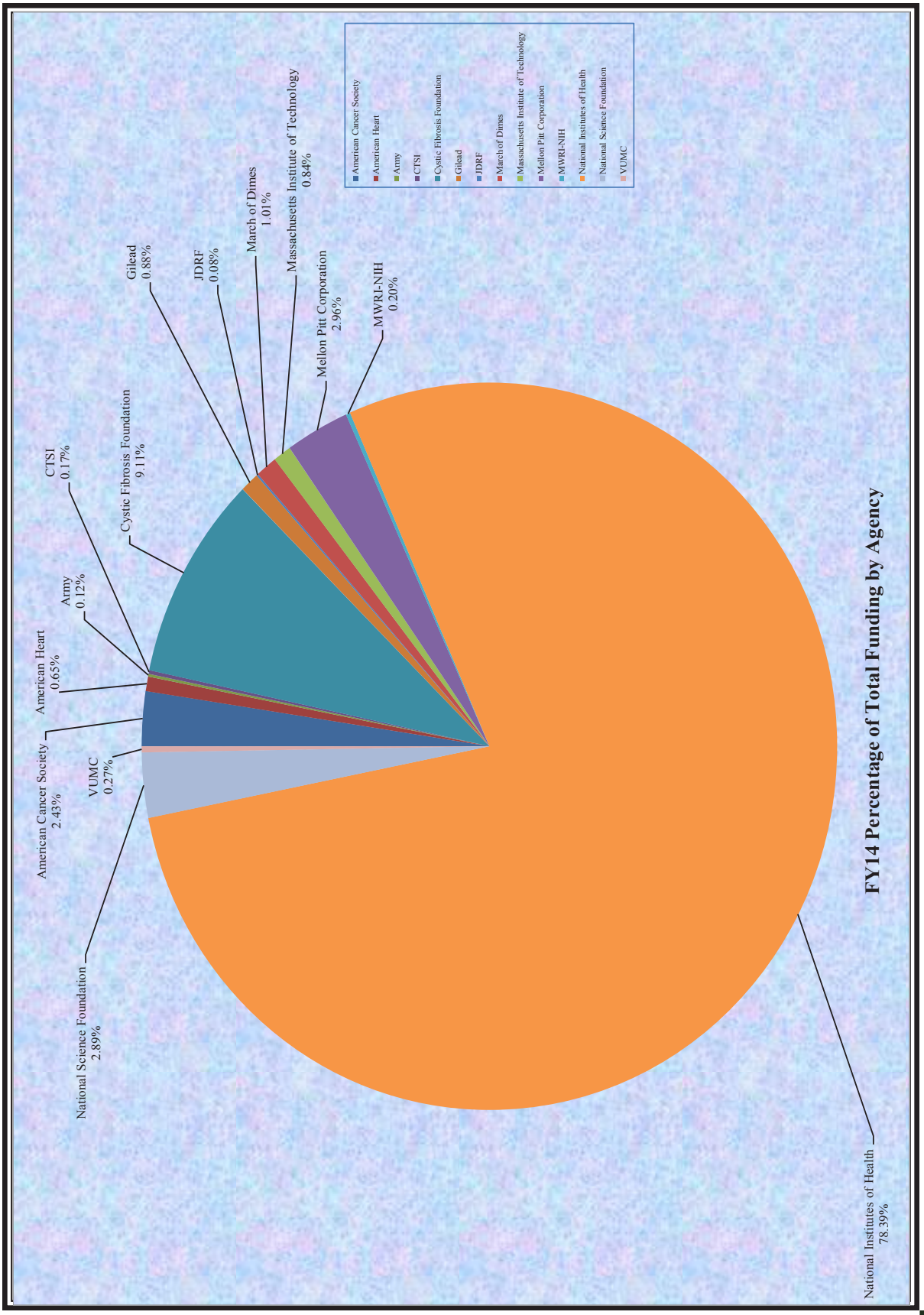
Simon C. Watkins, Ph.D.
Professor and Vice Chairman, Director of Center of Biologic Imaging

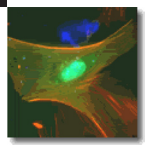
Member, Editorial Board, PittMed
Associate Editor, Experimental Biology and Medicine
Editor, Current Protocols in Cytometry
Editor, Experimental Science and Medicine

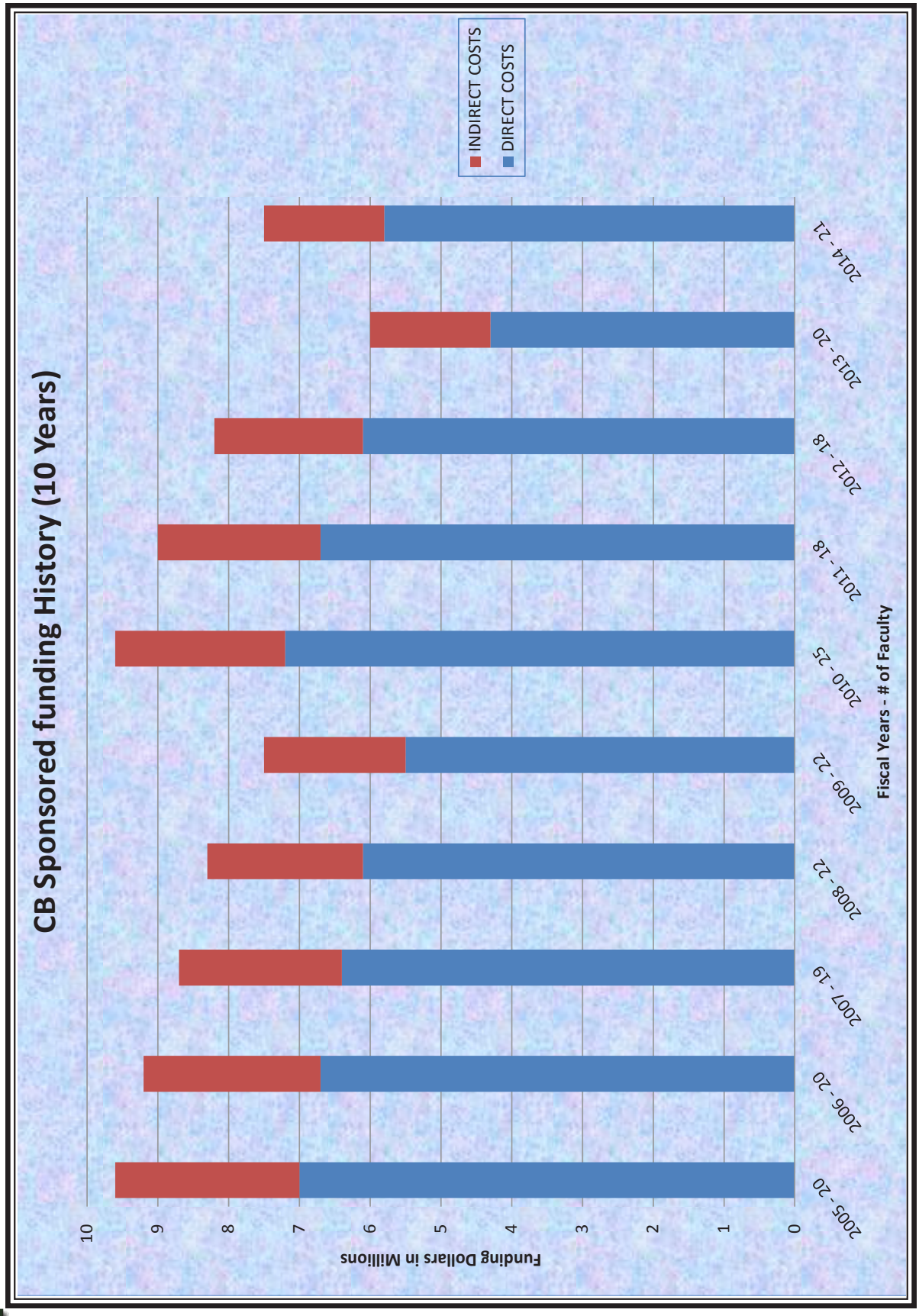
Christine C. Wu, Ph.D.
Associate Professor

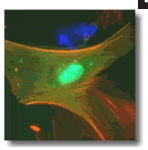
Editorial Board, Neurochemical Research
Editorial Board, Amino Acids (Proteomics Section)

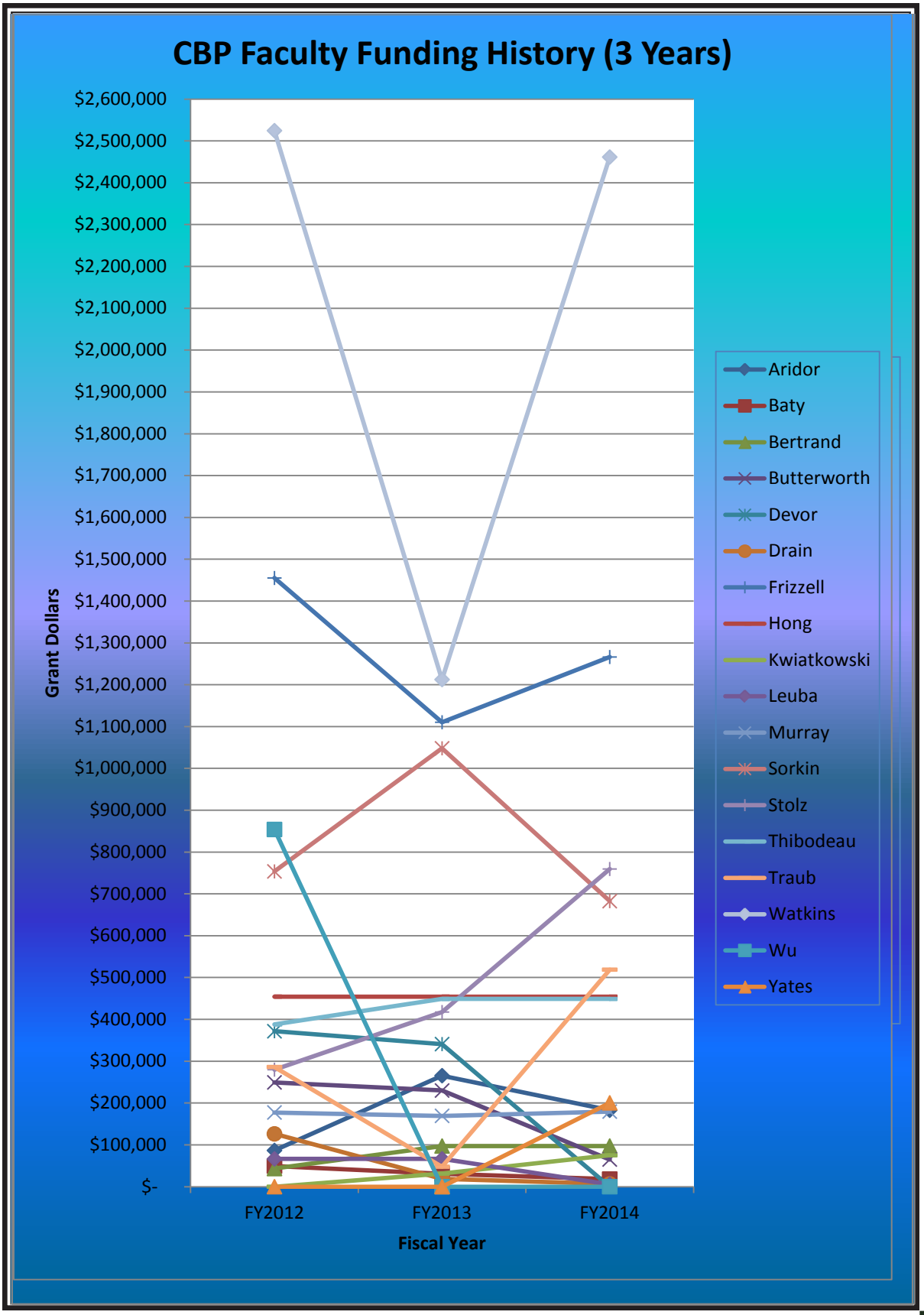


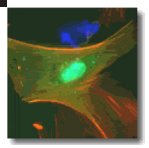

FY14 Percentage of Total Funding by Agency
National Institutes of Health 78.39%
National Science Foundation 2.89%
American Cancer Society 2.43%
American Heart 0.65%
Army 0.12%
CTSI 0.17%
Cystic Fibrosis Foundation 9.11%
Gilead 0.88%
JDRF 0.08%
March of Dimes 1.01%
Massachusetts Institute of Technology 0.84%
Mellon Pitt Corporation 2.96%
MWRI-NIH 0.20%
VUMC 0.27%
American Cancer Society
American Heart
Army
CTSI
Cystic Fibrosis Foundation
Gilead
JDRF
March of Dimes
Massachusetts Institute of Technology
Mellon Pitt Corporation
MWRI-NIH
National Institutes of Health
National Science Foundation
VUMC




CB Sponsored funding History (10 Years)
INDIRECT COSTS
DIRECT COSTS
Funding Dollars in Millions
0
1
2
3
4
5
6
7
8
9
10
2005 - 20
2006 - 20
2007 - 19
2008 - 22
2009 - 22
2010 - 25
2011 - 18
2012 - 18
2013 - 20
2014 - 21
Fiscal Years - # of Faculty



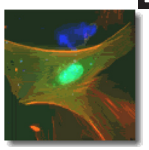

CBP Faculty Funding History (3 Years)
$2,600,000
$2,500,000
$2,400,000
$2,300,000
$2,200,000
$2,100,000
$2,000,000
$1,900,000
$1,800,000
$1,700,000
$1,600,000
$1,500,000
$1,400,000
$1,300,000
$1,200,000
$1,100,000
$1,000,000
$900,000
$800,000
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$-
Grant Dollars
FY2012
FY2013
FY2014
Fiscal Year
Aridor
Baty
Bertrand
Butterworth
Devor
Drain
Frizzell
Hong
Kwiatkowski
Leuba
Murray
Sorkin
Stolz
Thibodeau
Traub
Watkins
Wu
Yates



CBP FACULTY ROSTER
(Effective June, 2014)

Faculty Member	Salary Support on Grants	Rank	Status
Bertrand, Carol	100.0%	Res. Assistant Professor	Non-tenure Track
Gangopadhyay, Archana	100.0%	Res. Assistant Professor	Non-tenure Track
Mishra, Sanjay	100.0%	Res. Assistant Professor	Non-tenure Track
Peters, Kathryn	100.0%	Res. Assistant Professor	Non-tenure Track
Baty, Catherine	89.9%	Res. Assistant Professor	Non-tenure Track
Watkins, Simon*	79.9%	Professor	Tenured
Stolz, Donna	73.7%	Associate Professor	Tenured
Thibodeau, Patrick	68.3%	Assistant Professor	Tenure Track
Traub, Linton	67.4%	Associate Professor	Tenured
Frizzell, Raymond*	61.9%	Professor	Tenured
Hong, Yang	56.1%	Associate Professor	Tenured
Sorkin, Alexander*	48.5%	Professor	Tenured
Devor, Daniel	45.8%	Associate Professor	Tenured
Aridor, Meir	33.3%	Associate Professor	Tenured
Butterworth, Michael	31.0%	Assistant Professor	Tenure Track
Yates, Nathan*	24.7%	Associate Professor	Non-tenure Track
Murray, Sandra	17.0%	Professor	Tenured
Leuba, Sanford	5.0%	Associate Professor	Tenured
Wu, Christine	3.3%	Associate Professor	Tenured
Drain, Peter	0.2%	Associate Professor	Tenured
Devor, Daniel	0.0%	Associate Professor	Tenured
Duker, Georgia	0.0%	Assistant Professor	Non-tenure Track
Ford, Marijn	0.0%	Assistant Professor	Tenure Track
Ford, Natalia	0.0%	Res. Assistant Professor	Non-tenure Track
Gay, Vernon	0.0%	Associate Professor	Tenured
Kwiatkowski, Adam	0.0%	Assistant Professor	Tenure Track
O'Donnell, Allyson	0.0%	Res. Assistant Professor	Non-tenure Track

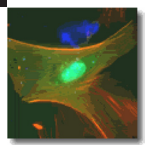
*Calculated using year appropriate NIH salary cap as upper limit for each grant



STUDENTS INVOLVED IN RESEARCH IN CBP FACULTY LABS
Snapshot as of June, 2014

GRADUATE STUDENTS ENROLLED IN CBMP PROGRAM

STUDENT	LAB	SUPPORT
Michael Calderon	Adam Kwiatkowski, Ph.D. Cell Biology	Adam Kwiatkowski, Ph.D. Cell Biology & Teaching Fellowship
Chelsea Merkel	Adam Kwiatkowski, Ph.D. Cell Biology	Adam Kwiatkowski, Ph.D. Cell Biology & Teaching Fellowship
Christine Klemens	Michael Butterworth, Ph.D. Cell Biology	Michael Butterworth, Ph.D. Cell Biology &Teaching Fellowship
George Michael Preston	Jeffrey Brodsky, Ph.D. Biological Sciences	Jeffrey Brodsky, Ph.D. Cell Biology & Teaching Fellowship
Kathryn Wack	Donna Stolz, Ph.D. Cell Biology	Donna Stolz, Ph.D. Cell Biology & ATP T32



Cell Biology Training Grants
FY13 and FY14

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

FY13 Projects

Aridor lab: *Lipid Environments in the Endoplasmic Reticulum and CFTR Sorting*
(Cystic Fibrosis Foundation)

Traub lab: *Mechanistic Role of Clarthrin Endocy*
(American Heart Association)

The combined funding for these post doctoral fellowship grants is $62,151 in FY13 (Total costs, annualized).

FY14 Projects

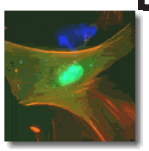
Traub lab: *Mechanistic Role of Clarthrin Endocy*
(American Heart Association)

The combined funding for this post doctoral fellowship grants is $48,000 in FY14 (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:

FY13 Program Grant Training Funds - $70,000
FY14 Program Grant Training Funds - $70,000



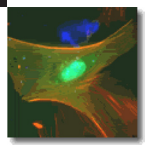
Cell Biology Program Grants (Fiscal Year 2013-14)

The Department of Cell Biology and Physiology is funded for four Program Grants, two 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 $913,492 (total costs) in FY14.

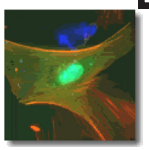
Cystic Fibrosis Center funded Research Development Program (Principal Investigator/ Program Director - Raymond A. Frizzell, Ph.D.):
(Abstract from the original application) A Cystic Fibrosis Foundation sponsored Research



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 $460,000 (total costs) in FY14. 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.

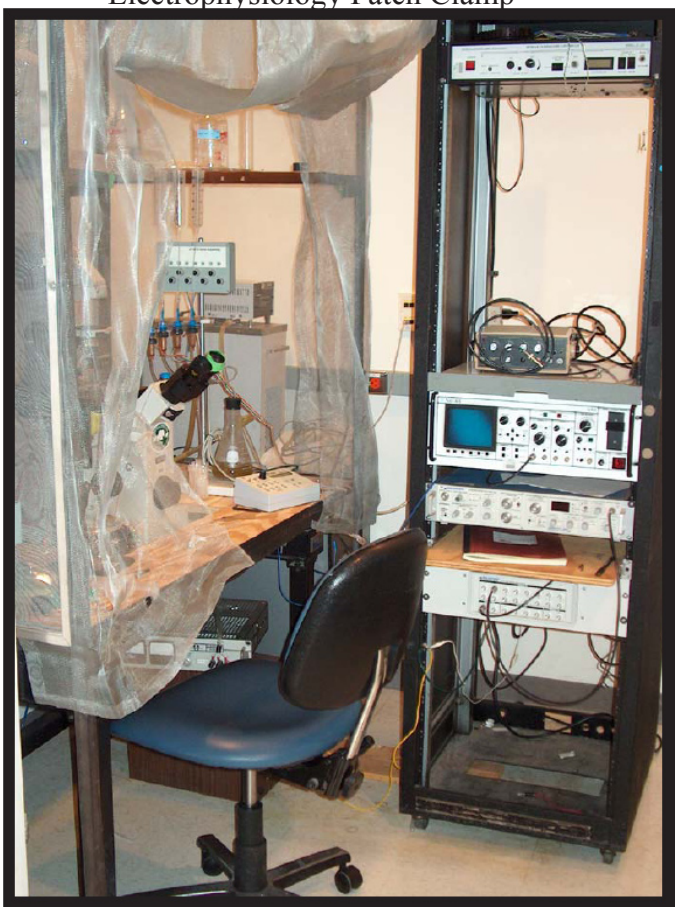
National Technology Centers for Networks and Pathways
(Principal Investigators –Simon Watkins, Ph.D.):
Over the last several years, microscopy as a scientific tool has reinvented itself. It has changed from a group of principally descriptive methodologies, to a wide range of quantitative tools and techniques 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

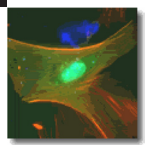


Molecular Biosensor and Imaging Center (MBIC) at CMU has a long history of developing and applying innovative microscopy and imaging technologies. The ultimate goal of this Center will be to act as a catalyst to strengthen and expand the impact of the new probe developments by providing facilities and 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 $212,939 (total costs) in FY14.

Electrophysiology Patch Clamp

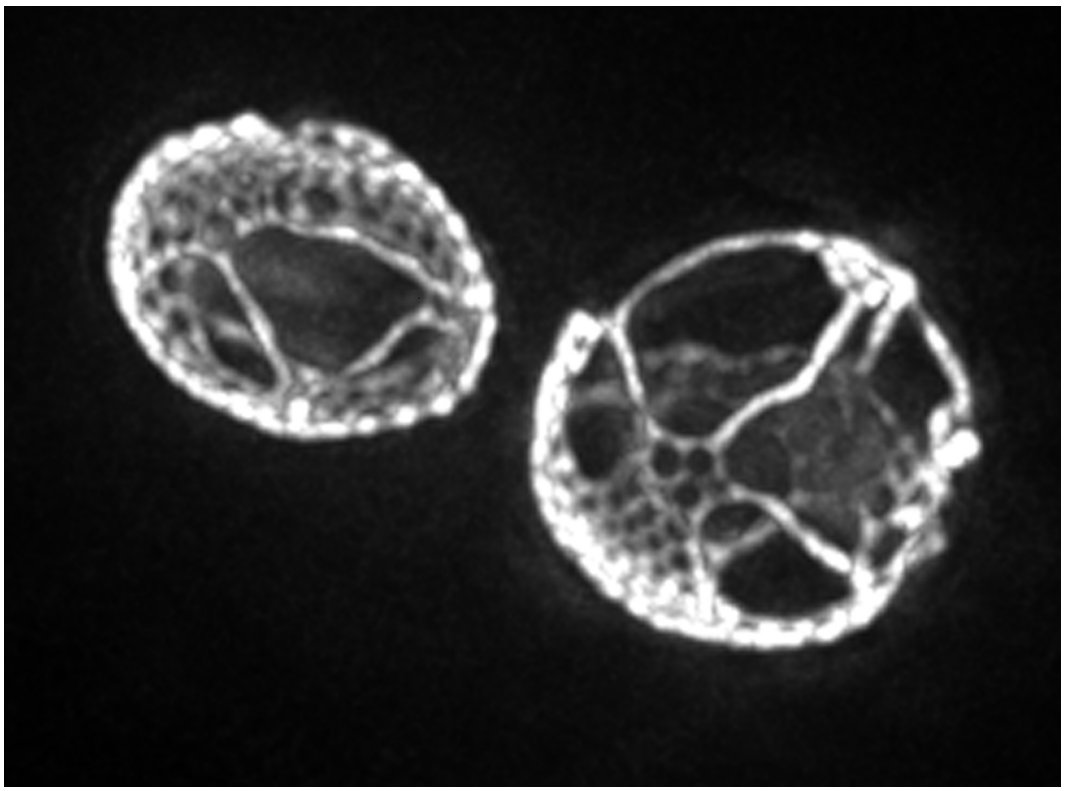




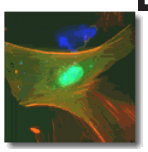
New CBP Research Recruits in FY13

Name	Rank
Faculty Level	
Marijn Ford	Assistant Professor
Natalie Ford	Research Assistant Professor
Sanjay Mishra	Research Assistant Professor

Name	Rank	Lab Association
Post Doctoral Level		
Anupma Jha	Post Doctoral Associate	Dr. Linton Traub
Mads Larsen	Post Doctoral Associate	Drs. Frizzell & Watkins
Shalini Mitra	Post Doctoral Associate	Dr. Raymond Frizzell
Yi Zhou	Post Doctoral Associate	Dr. Raymond Frizzell



Marijn Ford. The mitochondrial network in yeast W303A cells lacking the dynamin-related protein Dnm1. Dnm1 is responsible for mitochondrial division. In its absence, unopposed fusion results in an extensively interconnected mitochondrial network with a netted appearance. The mitochondria were visualized by introduction of a fluorescent protein specifically targeted to the mitochondrial matrix.



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, cellular and molecular biology to understand the integrated functions of cells, tissues, organs and model 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.

CBMP students have the opportunity to develop their teaching and mentoring skills by participating as instructors for the histology laboratory sections taught to first and second year medical students. Student instructors assist the medical students in using microscopes and presentations to identify tissues and cells as well as to understand the functions of the tissues and cells that they are observing. Teaching responsibilities normally require approximately 5 to 10 hours per month of preparation and teaching time. Prior to becoming instructors, the CMBP students are required to take the graduate level course in Histology (MSCBMP2870), which will prepare them for their teaching responsibilities. Senior students may have the opportunity to develop and present lectures in the graduate Histology Course. Beyond the teaching experience, these fellowships also provide students with funding for the majority of their stipend and tuition for two years.

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 metabolic, developmental and reproductive functions.

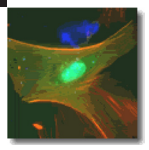
Cell Communication and Imaging

Controlled cell-cell communication is the basis of tissue homeostasis. Member faculty use a variety of techniques to study these phenomena.

Gerard Apodaca, Ph.D. (Medicine, Renal)
Yang Hong, Ph.D.
Adam V. Kwiatkowski, Ph.D.
Sandra Murray, Ph.D.
Claudette St Croix, Ph.D. (EOH)
Donna Beer Stolz, Ph.D.
Simon C. Watkins, Ph.D.

Cellular Injury and Wound Healing

James L. Funderburgh, Ph.D. (Opthalmology)
David Hackam, M.D., Ph.D. (Children's Hospital)



Rama K. Mallampalli, M.D. (Medicine)
Sandra Murray, Ph.D.
Gary Silverman, M.D., Ph.D. (Children's Hospital)
Shivalingappa Swamynathan, Ph.D. (Opthalmology)

Chromatin, DNA Repair, Cell Cycle Control, Gene expression and Cancer

Areas of study include the regulation of chromatin structure and repair 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.

Arjumand Ghazi. Ph.D. (Children's Hospital)
Sanford Leuba, Ph.D.
Laura Niedernhofer, M.D., Ph.D. (UPCI, adjunct Scripps Institute, Jupiter, FL)
Shivalingappa Swamynathan, Ph.D. (Opthalmology)
William Walker, Ph.D. (MWRI)
Yong Wan, Ph.D. (UPCI)
Judith Yanowitz, Ph.D. (MWRI)

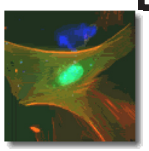
Ion Channel Biology

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.

Michael B. Butterworth, Ph.D.
Daniel C. Devor, Ph.D.
Raymond A. Frizzell, Ph.D. (Children's Hopsital)
Kenneth Hallows, M.D., Ph.D. (Medicine, Renal)
Thomas R. Kleyman, M.D. (Medicine, Renal)
Guy Salama, Ph.D. (Medicine, Cardiology)
Arohan Subramanya, M.D. (Medicine, Renal)
Patrick Thibodeau, 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.

Gerard Apodaca, Ph.D. (Medicine, Renal)
Meir Aridor, Ph.D.
Jeffrey Brodsky, Ph.D. (Biological Sciences)
Carolyn Coyne, Ph.D. (Microbiology and Molecular Genetics)
Marijn Ford, Ph.D.
Yang Hong, Ph.D. (UPCI)
Rebecca Hughey, Ph.D. (Medicine, Renal)
John Johnson, Ph.D. (Medicine, Renal)
Tom Kleyman, M.D. (Medicine, Renal)
Sandra Murray, Ph.D.
David Perlmutter, M.D. (Children's Hospital)
Alexander Sorkin, Ph.D.
Agnieszka Swiatecka-Urban, M.D. (Children's Hospital)
Linton Traub, Ph.D.
Ora Weisz, Ph.D. (Medicine, Renal)

Regulation of Gene Expression during Development

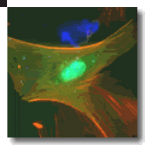
Identifying the factors that control gene expression is central to understanding how normal and malignant cell growth is regulated. Scientists in this program are identifying components of the gene transcription machinery that mediate signaling by steroid and peptide hormones, which control germ cell 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.

Arjumand Ghazi, Ph.D. (Children's Hospital)
Judith Yanowitz, Ph.D. (MWRI)
Donna Beer Stolz, Ph.D.
Simon C. Watkins, Ph.D.
Yang Hong, Ph.D.

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.

Jennifer Condon, Ph.D. (MWRI)



Arjumand Ghazi, Ph.D. (Children's Hopsital)
Nuria Pastor-Soler, M.D., Ph.D. (Medicine, Renal)
Tony Plant, Ph.D. (MWRI)
Aleksandar Rajkovic, M.D., Ph.D. (MWRI)
Abhirim Sahu, Ph.D. (MWRI)
Gerald P. Schatten, Ph.D. (MWRI)
William Walker, Ph.D. (MWRI)
Judith Yanowitz, Ph.D. (MWRI)
Anthony Zeleznik, Ph.D. (MWRI)

Signal Transduction in Diabetes and Metabolism

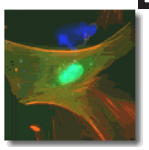
Regulated secretion of insulin by the pancreas and the actions of insulin and leptin in muscle, fat and liver cells are critical for controlling the body's energy metabolism. Disruption of these processes leads to diabetes or obesity. Researchers in this program are defining the cell signaling mechanisms 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.

Peter Drain, Ph.D.
Arjumand Ghazi, Ph.D. (Children's Hospital)
Abhiram Sahu, Ph.D. (MWRI)
David Whitcomb, M.D., Ph.D. (Medicine, Gastroenterology)

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 multi-parallel data sets both in vitro and in vivo. See current resources at www.cbi.pitt.edu.
Additionally, Center faculty are active in teaching graduate courses in imaging technologies as well as their research specialties.

Director of CBI: Simon Watkins, Ph.D.
Associate Director: Donna Beer Stolz, Ph.D.
Assistant Director: Claudette M. St. Croix, Ph.D.



Courses in the Cell Biology and Molecular Physiology Graduate Program

Courses in FY-13

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

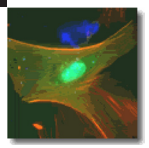
Description: A directed research project that results in a thesis for a Master's Degree.

Title: Regulation of Membrane Traffic
Course Number: 2840
Course Director: Gerard Apodaca and 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. The general goal is to teach students how to read and interpret the literature. In particular, we emphasize the conclusions of the assigned papers, examine the experimental basis of these conclusions, and discuss their validity. The course is updated each year to include topics in which new and interesting developments have occurred. Emphasis is placed on how membrane traffic is regulated and how it is disrupted or subverted during disease processes. The course is of general interest to students, fellows, and faculty interested in cell biology, immunology, neurobiology, pharmacology, and virology.

Title:
Research Seminar in Cellular Biological 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 membrane traffic.



Title: Research Seminar in Reproductive Physiology
Course Number: 2853
Course Director: William Walker
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 in Molecular Physiology
Course Number: 2855
Course Director: Thomas Kleyman
When: Fall Term, Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

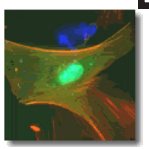
Description: Advanced Research Seminar with Journal Club format specializing in current aspects of molecular and cellular physiology.

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

Description: 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 electron micrographic 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: Experiments and Logic in Cell Biology
Course Number: 2875
Course Director: Peter Drain, and Donna Beer Stolz
When: Spring and Fall Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: The purpose of Experiments and Logic in Cell Biology (ELCB) is to engage the students of the Cell Biology and Molecular Physiology graduate program in a self-directed seminar structured to stimulate the students ability to think scientifically and critically as future scientists. The iterative, collaborative and collegial process of ELCB is the same used by teams of collaborating scientists to develop and solve biomedical projects.

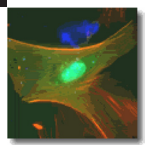
Title: Cellular Biology of Normal and Disease States
Course Number: 2880
Course Director: Gerard Apodaca
When: Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference
Core Course for: Cell Biology and Molecular Physiology Program

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: Imaging Cell Biology in Living Systems
Course Number: 2885
Course Director: Simon Watkins
When: Spring Term
Prerequisites: None

Description: The focus of this course is to study relevant problems in Cell Biology, Immunology, Developmental Biology and Neurobiology and how they have been solved using imaging approaches. The course will follow a Lecture/Demo/Journal Club format. Lectures will be interspersed with a journal club discussion of a relevant paper on each technology.

Title: Directed Study
Course Number: 2890



Course Director: Donna Beer Stolz
When: Fall Term, Spring Term, Summer Term, and Fall Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

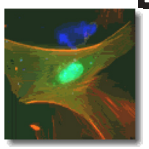
Description: This course provides the student an opportunity to carry out a specific laboratory project in any area of interest in Cell Biology or Physiology.

Title: Ph.D. Dissertation Research
Course Number: 3800
Course Director: Donna Beer Stolz
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.

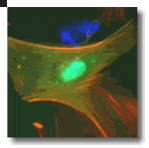
Title: DNA Repair Journal
Course Number: 3835
Course Director: Robert Sobol
When: Fall Term, Spring Term
Prerequisites: INTBP 2000 Foundations of Biomedical Sciences
INTBP 2005 Conference

Description: The course is a journal club on current topics in DNA Repair as it relates to human disease, DNA damage processing, genome stability, telomere biology, cancer and aging. Primarily designed for students in the second year of their graduate program and beyond. Presentations will be held twice per month during the fall and spring semester. In order to receive credit for the course, students must attend a minimum of 80% of the sessions, present once per semester, participate in class discussion and complete anonymous peer-evaluations for each presenter. One week prior to presentation, presenters will identify a recent publication in the field and distribute it to their classmates. Presenters must define the hypothesis of the paper, provide background and significance, describe experimental methods used, interpret the data, conclude whether the data support the author's conclusions and propose future experiments. Grades will be determined by attendance (10%), class participation (20%) and quality of presentation (70%).



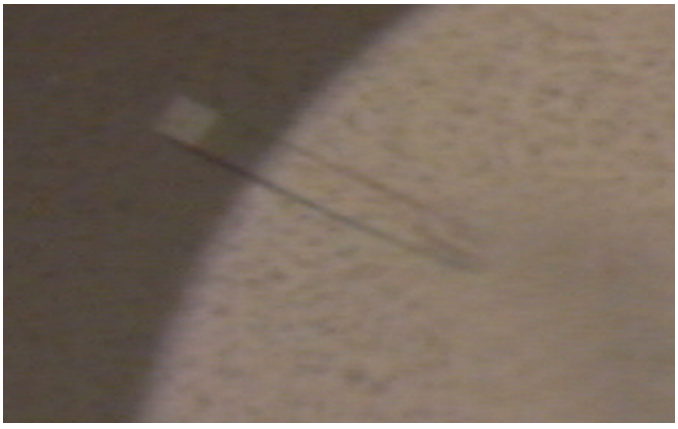
Title: Reproductive Development from Model Organisms to Humans
Course Number: 3840
Course Directors: Jennifer Condon-Jeysuria and Judith Yanowitz
When: Fall Term
Prerequisites: None

Description: This course focuses on the molecular aspects of the transition from gamete to a reproductive organism. The course progresses through the building of germ cells, fertilization and stem cell participation to sex determination, gonad morphogenesis, puberty, menopause and pregnancy. This course highlights both human and model organisms to bring together diverse aspects of the cell and developmental biology of reproductive tissues and their impact on disease pathology.

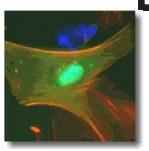


Faculty Teaching Honors (Fiscal Year 2013-2014)

NONE

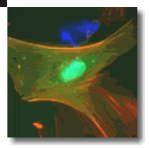


Marijn Ford. Crystal of a member of the dynamin-related protein family of large GTPases



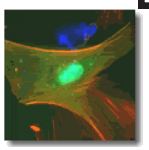
University of Pittsburgh School of Medicine
Educational Credit Units (AY 12-13)
Department of Cell Biology
Summary of Faculty ECU's

Faculty Name	Activity	ECURV	Units	ECUs
Aridor, Meir				
	GS - Lecture	2.0	10.0	20.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	1.0	5.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	31.0	62.0
			Total ECUs:	87.0
Butterworth, Michael				
	MS-1, MS-2 - Laboratory	2.0	7.3	14.7
	MS-1, MS-2 - Lecture	2.0	1.5	3.0
	MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	11.5	23.0
	GS - Lecture	2.0	6.0	12.0
	GS - Ph.D. or M.Sc. Mentor	50.0	1.0	50.0
			Total ECUs:	102.7
Devor, Daniel				
	GS - Chair: Comprehensive, Dissertation, Thesis, Preliminary or Reprint Committee	5.0	1.0	5.0
	GS - Lecture	2.0	6.0	12.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	1.0	5.0
	GS - Ph.D. or M.Sc. Mentor	50.0	1.0	50.0
			Total ECUs:	72.0
Drain, Peter				
	MS-1, MS-2 - Course Director	200.0	2.0	400.0
	MS-1, MS-2 - Lecture	2.0	4.0	8.0
	MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	23.3	46.5
	MS - Applicant Interviewer	1.0	10.0	10.0
	MS - Member, Admissions Committee	75.0	1.0	75.0
	MS - Member, Promotions Committee	5.0	1.0	5.0
	GS - Chair: Comprehensive, Dissertation, Thesis, Preliminary or Reprint Committee	5.0	1.0	5.0
	GS - Lecture	2.0	4.0	8.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	3.0	15.0
	GS - Member: Curriculum, Recruiting, Program, or other SOM Committee	2.0	1.0	2.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	12.0	24.0
			Total ECUs:	598.5
Duker, Georgia				
	MS-1, MS-2 - Course Director	200.0	1.0	200.0
	MS-1, MS-2 - Course Laboratory Segment/Session Coordinator	5.0	2.0	10.0
	MS-1, MS-2 - Laboratory	2.0	27.0	54.0



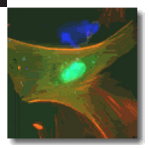
University of Pittsburgh School of Medicine
Educational Credit Units (AY 12-13)
Department of Cell Biology
Summary of Faculty ECU's

Faculty Name	Activity	ECURV	Units	ECUs
	MS-1, MS-2 - Lecture	2.0	27.2	54.5
	MS-1, MS-2 - Other	2.0	6.0	12.0
	MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	31.8	63.5
	MS - Coordinator, Undergraduate Medical Education Teaching	5.0	1.0	5.0
	MS - Member, Promotions Committee	5.0	1.0	5.0
	MS - Mentored Scholarly Project (MSP) Mentor	25.0	1.0	25.0
	MS - Mentoring medical students (e.g., FAST, AOC, or academic advising)	2.0	6.0	12.0
	MS - Research Mentor, Other (non-MSP)	1.0	40.0	40.0
	GS - Laboratory supervision (e.g., MSTP, Ph.D. & M.Sc.)	1.0	28.0	28.0
	GS - Lecture	2.0	35.0	70.0
	GS - Other	2.0	6.0	12.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	12.0	24.0
		Total ECUs:		615.0
Frizzell, Raymond				
	MS-1, MS-2 - AOC/Longitudinal Curriculum Program Director	20.0	1.0	20.0
	MS-1, MS-2 - Laboratory	2.0	58.5	117.0
	MS-1, MS-2 - Lecture	2.0	3.0	6.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	2.0	4.0
		Total ECUs:		147.0
Hong, Yang				
	GS - Chair: Comprehensive, Dissertation, Thesis, Preliminary or Reprint Committee	5.0	1.0	5.0
	GS - Lecture	2.0	4.0	8.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	2.0	10.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	2.0	4.0
		Total ECUs:		27.0
Kwiatkowski, Adam				
	GS - Lecture	2.0	9.0	18.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	1.0	5.0
		Total ECUs:		23.0
Leuba, Sanford				
	GS - Chair: Admissions Committee	100.0	1.0	100.0
	GS - Chair: Comprehensive, Dissertation, Thesis, Preliminary or Reprint Committee	5.0	2.0	10.0
	GS - Lecture	2.0	2.0	4.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	1.0	5.0
	GS - Member: Curriculum, Recruiting, Program, or other SOM Committee	2.0	1.0	2.0
	GS - Member: Program Steering Committee	40.0	1.0	40.0



University of Pittsburgh School of Medicine
Educational Credit Units (AY 12-13)
Department of Cell Biology
Summary of Faculty ECU's

Faculty Name / Activity	ECURV	Units	ECUs
GS - Ph.D. or M.Sc. Mentor	50.0	2.0	100.0
GS - Small group (e.g., PBL, conference, workshop)	2.0	19.5	39.0
	Total ECUs:		300.0
Murray, Sandra			
MS-1, MS-2 - Laboratory	2.0	32.3	64.5
MS-1, MS-2 - Lecture	2.0	3.0	6.0
MS-1, MS-2 - Other	2.0	18.0	36.0
MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	2.0	4.0
MS - Member, Promotions Committee	5.0	1.0	5.0
GS - Lecture	2.0	1.0	2.0
GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	1.0	5.0
	Total ECUs:		122.5
ODonnell, Allyson			
GS - Lecture	2.0	1.0	2.0
	Total ECUs:		2.0
Peters, Kathryn			
MS-1, MS-2 - Laboratory	2.0	58.5	117.0
MS-1, MS-2 - Lecture	2.0	3.0	6.0
	Total ECUs:		123.0
Ryan, Kathleen			
MS-1, MS-2 - Block Director	10.0	2.0	20.0
MS-1, MS-2 - Lecture	2.0	6.5	13.0
MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	4.5	9.0
MS - Applicant Interviewer	1.0	23.0	23.0
MS - Member, Curriculum Committee	20.0	1.0	20.0
MS - Member, Promotions Committee	5.0	1.0	5.0
MS - Member, Retention Committee	5.0	2.0	10.0
	Total ECUs:		100.0
Sorkin, Alexander			
GS - Lecture	2.0	6.0	12.0
GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	2.0	10.0
GS - Ph.D. or M.Sc. Mentor	50.0	1.0	50.0
	Total ECUs:		72.0
Stolz, Donna			
MS-1, MS-2 - Laboratory	2.0	7.3	14.7

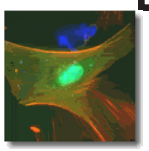


University of Pittsburgh School of Medicine
Educational Credit Units (AY 12-13)
Department of Cell Biology
Summary of Faculty ECU's

Faculty Name	Activity	ECURV	Units	ECUs
	MS-1, MS-2 - Lecture	2.0	2.3	4.7
	MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	4.8	9.5
	GS - Chair: Comprehensive, Dissertation, Thesis, Preliminary or Reprint Committee	5.0	4.0	20.0
	GS - GS Academic Advisor	2.0	1.0	2.0
	GS - Laboratory supervision (e.g., MSTP, Ph.D. & M.Sc.)	1.0	13.0	13.0
	GS - Lecture	2.0	17.0	34.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	13.0	65.0
	GS - Member: Curriculum, Recruiting, Program, or other SOM Committee	2.0	1.0	2.0
	GS - Member: Program Steering Committee	40.0	2.0	80.0
	GS - Ph.D. or M.Sc. Mentor	50.0	1.0	50.0
	GS - Program Director	100.0	1.0	100.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	14.8	29.5
		Total ECUs:		424.3
Thibodeau, Patrick				
	MS-1, MS-2 - Laboratory	2.0	58.5	117.0
	MS-1, MS-2 - Lecture	2.0	3.0	6.0
	MS-1, MS-2 - Small group (e.g., PBL, conference, workshop)	2.0	8.0	16.0
	GS - Associate Director	75.0	1.0	75.0
	GS - Lecture	2.0	5.5	11.0
	GS - Member: Admissions Committee	75.0	1.0	75.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	4.0	20.0
	GS - Member: Program Steering Committee	40.0	1.0	40.0
	GS - Ph.D. or M.Sc. Mentor	50.0	1.0	50.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	11.5	23.0
		Total ECUs:		433.0
Traub, Linton				
	GS - Associate Director	75.0	1.0	75.0
	GS - Chair: Comprehensive, Dissertation, Thesis, Preliminary or Reprint Committee	5.0	2.0	10.0
	GS - Lecture	2.0	10.0	20.0
	GS - Member: Comprehensive, Dissertation, Thesis, Preliminary or Reprint	5.0	3.0	15.0
	GS - Small group (e.g., PBL, conference, workshop)	2.0	37.0	74.0
		Total ECUs:		194.0
Watkins, Simon				
	MS-1, MS-2 - AOC/Longitudinal Curriculum Program Director	20.0	1.0	20.0
	MS-1, MS-2 - Laboratory	2.0	85.5	171.0
	MS-1, MS-2 - Lecture	2.0	4.8	9.7

OFFICE OF MEDICAL EDUCATION 1/20/2014

DEPARTMENT OF Cell Biology
Page 4 of 5

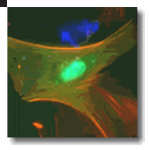


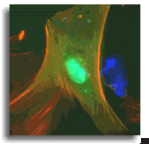
University of Pittsburgh School of Medicine
Educational Credit Units (AY 12-13)
Department of Cell Biology
Summary of Faculty ECU's

Faculty Name	Activity	ECURV	Units	ECUs
	GS - Lecture	2.0	20.5	41.0
	GS - Other	2.0	4.0	8.0
			Total ECUs:	249.7
			Subtotal:	**3692.7**

Total Faculty Reporting: 18

Total ECU's for Cell Biology: 3692.7



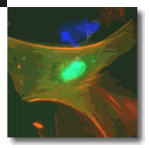


Post Doctoral Personnel Data
[Current as of June, 2014]

Name	Title	Office Address	Email Address	Office Phone	Fax	Research Focus
Ahner, Annette	Vis. Research Associate	7161 RANCH	aschneid@pitt.edu	412-648-8162	412-648-8330	Frizzell Lab
Caltagarone, John	Post Doctoral Associate	S372 BSTWR	jmcalt@pitt.edu	412-648-9260	412-648-8330	Sorkin Lab
Chen, Nianhong	Post Doctoral Associate	HCCLB-2.7	nic40@pitt.edu	412-623-7811	412-623-7761	Wan Lab
Chen, Yi-Jiun	Post Doctoral Associate	S333 BSTWR	yic42@pitt.edu	412-648-2846	412-648-8330	Hong Lab
Dong, Wei	Post Doctoral Associate	S333 BSTWR	wed16@pitt.edu	412-648-2846	412-648-8330	Hong Lab
Fortian-Bernabeu, Arola	Post Doctoral Associate	S372 BSTWR	arf48@pitt.edu	412-624-8147	412-648-8330	Sorkin Lab
Gong, Xiaoyan	Research Associate	7161 RANCH	xig17@pitt.edu	412-692-9335	412-692-8906	Frizzell Lab
Larsen, Mads	Post Doctoral Associate	S234 BSTWR	mbl6@pitt.edu	412-648-9796	412-648-8330	Frizzell/Watkins
Long, Kimberly	Post Doctoral Associate	S307 BSTWR	krl34@pitt.edu	412-624-1971	412-648-8330	Aridor Lab
Mitra, Shalini	Post Doctoral Associate	S315 BSTWR	shm70@pitt.edu	412-624-8269	412-648-8330	Frizzell Lab
Perunthathu, Umasankar	Post Doctoral Associate	S306 BSTWR	ukp1@pitt.edu	412-624-9713	412-648-8330	Traub Lab
Pinilla-Macua, Itziar	Post Doctoral Associate	S372 BSTWR	itp2@pitt.edu	412-624-8147	412-648-8330	Sorkin Lab
Ran, Yanchao	Post Doctoral Associate	S332 BSTWR	yar4@pitt.edu	412-624-0869	412-648-8330	Thibodeau Lab
Wang, Xiaohui	Post Doctoral Associate	S315 BSTWR	xiw68@pitt.edu	412-648-8620	412-648-8330	Frizzell Lab
Zhang, Liang	Post Doctoral Associate	S332 BSTWR	liz46@pitt.edu	412-624-8933	412-648-8330	Thibodeau Lab
Zhou, Zhuan	Post Doctoral Associate	HCCLB-2.6	zhouz2@upmc.edu	412-623-7811	412-623-7761	Wan Lab

Current Cell Biology and Molecular Physiology Graduate Program Students as of June 30, 2013

Student	Mentor	Year
Cavita Chotoo	Dr. Daniel Devor	7th
Chelsea Crum	Dr. Patrick Thibodeau	1st
Elizabeth Delorme-Axford	Dr. Carolyn Coyne	4th
Christine Klemens	Dr. Mike Butterworth	1st
George Michael Preston	Dr. Jeff Brodsky	1st
Xinxian Qiao	Dr. Yong Wan	4th
Arvind Suresh	Dr. Jennifer Condon	4th
Christina Szalinski	Dr. Ora Weisz	4th
Kathryn Wack	Dr. Donna Beer-Stolz	3rd



Prior Graduates of the Cell Biology and Molecular Physiology Program as of June 2013
(Past five years)

Christina Szalinski, Ph.D.
Defended May 20, 2013
American Society for Cell Biology (ASCB), Bethesda, MD

Cavita Kitty Chotoo, Ph.D.
Defended March 26, 2013
Rutger's, Post-Doc

Elizabeth Delorme-Axford, Ph.D.
Defended March 14, 2013
Post-Doc University of Pittsburgh, Dept. Microbiology & Molecular Genetics

Xinxian Qiao, M.S.
Defended December 17, 2012
Technician, Hillman Cancer Center, Pittsburgh, PA

Anupma Jha, Ph.D.
Defended December 8, 2011

Siobhan Gregg, Ph.D.
Defended November 4, 2011
New York Academy of Sciences Event Organizer

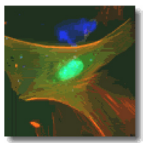
Daniel Rho, Ph.D.
Defended July 15, 2011
Plastic Surgery Resident, Harvard U.

James R. Thieman, Ph.D.
Defended June 9, 2011
Olympus Corporation

ShanShan Cui, Ph.D.
Defended December 7, 2010
Faculty, Galen College of Nursing, Cincinnati, Ohio

Mark A. Bailey, Ph.D.
Defended September 23, 2010
Post-Doc, Vollum Institute, Oregon

Paula J. Bernal, PH.D.
Defended August 12, 2010
Staff, Center for Vaccine Development, University of Maryland



Ethan Block, Ph.D.
Defended January 19, 2010
Post-Doc, University of Pittsburgh, Department of Neurobiology

Bado Hewa DeFranco, Ph.D.
Defended September 3, 2009
Faculty, University of Pittsburgh at Greensburg, National Sciences, General Adm.

Mark R. Silvis, Ph.D.
Defended September 3, 2009
Post-Doc Fred Hutchinson Cancer Research Center, Seattle Washington

Roxana Teisanu, Ph.D.
Defended April 30, 2009
Post-Doc, Ecole Politechnique Federal de Lausanne (EPFL), Switzerland

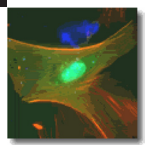
Michelle Wood, Ph.D.
Defended April 29, 2009
Post-Doc, University of Michigan, Ann Arbor, MI, Magee Women's Research Institute

Dan Constantinescu, Ph.D.
Defended December 8, 2008
Frommer, Lawrence, and Haug, LLP, New York, NY

Christopher Guerriero, Ph.D.
Defended September 24, 2008
University of Pittsburgh Medical School, Dept. of Biological Sciences

Mark Miedel, Ph.D.
Defended August 27, 2008
Post-Doc University of Pittsburgh Medical School

Christopher Lewarcick, Ph.D.
Defended August 18, 2008
Post-Doc University of Pittsburgh Medical School

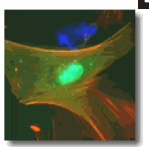


Student Ratings of CBMP Faculty Teaching FY2014

Name	Course	Type	Date	Rating	Ave
Butterworth	Methods and Logic in Medicine Part 2	SGCS	Fall-13	3.50	
Butterworth	Cellular and Pathological Basis of Disease	LAB	Spring-14	4.40	
Butterworth	Cellular and Pathological Basis of Disease	PBL	Spring-14	4.30	4.07
Drain	Methods and Logic in Medicine Part 2	SGCS	Fall-12	4.60	4.60
Duker	Introduction to Being a Physician	SGCS	Fall-13	4.80	
Duker	Body Fluid Homeostasis Cardiovascular	WKSP	Fall-13	4.20	
Duker	Body Fluid Homeostasis-Renal Segment	LEC	Fall-13	4.90	
Duker	Body Fluid Homeostasis-Pulmonary Segment	LEC	Fall-13	4.80	
Duker	Digestion and Nutrition	LEC	Fall-13	4.80	
Duker	Digestion and Nutrition	LAB	Fall-13	4.80	4.72
Kwiatkowski	Immunology in Health and Disease	LEC	Spring-14	4.00	4.00
Murray	Medical Anatomy	LAB	Fall-13	4.10	
Murray	Medical Anatomy	SGCS	Fall-13	4.00	4.05
Ryan	Body Fluid Homeostasis Cardiovascular	WKSP	Fall-13	5.00	
Ryan	Cellular and Pathological Basis of Disease	LEC	Spring-14	3.90	
Ryan	Digestion and Nutrition	LEC	Fall-13	4.20	4.37
Stolz	Cellular and Pathological Basis of Disease	LEC	Spring-14	4.50	
Stolz	Cellular and Pathological Basis of Disease	LAB	Spring-14	4.60	
Stolz	Cellular and Pathological Basis of Disease	PBL	Spring-14	4.80	
Stolz	Digestion and Nutrition	LAB	Fall-13	4.80	4.68
Thibodeau	Methods and Logic in Medicine 2	SGCS	Fall-13	4.20	4.20
	Overall Teaching Average			**4.44**	

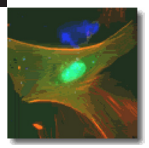
Type codes:

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



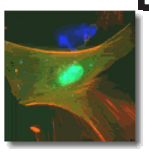
CBP FACULTY ROSTER
(Effective June, 2013)

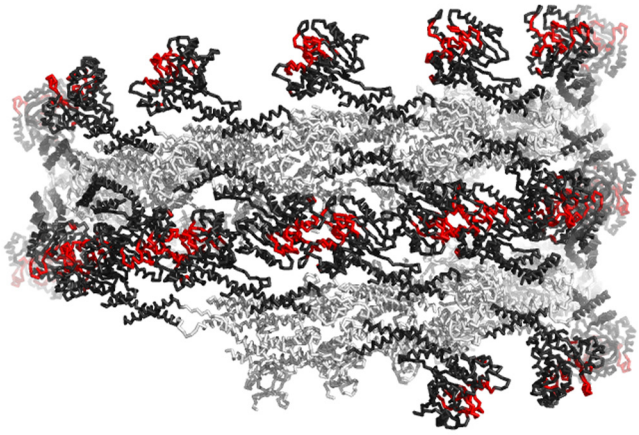
Last Name	First	Rank	Status
Sorkin	Alexander	Professor & Chair	Tenured
Devor	Daniel	Professor	Tenured
Frizzell	Raymond	Professor	Tenured
Murray	Sandra	Professor	Tenured
Watkins	Simon	Professor	Tenured
Aridor	Meir	Associate Professor	Tenured
Drain	Peter	Associate Professor	Tenured
Gay	Vernon	Associate Professor	Tenured
Hong	Yang	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
Wu	Christine	Associate Professor	Tenured
Yates	Nathan	Associate Professor	Non-tenure Track
Butterworth	Michael	Assistant Professor	Tenure Track
Ford	Marijn	Assistant Professor	Tenure Track
Kwiatkowski	Adam	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
Ford	Natalia	Res. Assistant Professor	Non-tenure Track
Gangopadhyay	Archana	Res. Assistant Professor	Non-tenure Track
Mishra	Sanjay	Res. Assistant Professor	Non-tenure Track
O'Donnell	Allyson	Res. Assistant Professor	Non-tenure Track
Peters	Kathryn	Res. Assistant Professor	Non-tenure Track



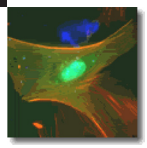
New CBP Faculty in FY13

Name	Prior Institution /Rank	Current Rank
Marijn Ford	University of California, Davis Davis, CA	Assistant Professor
Natalia Ford	University of California, Davis Davis, CA	Research Assistant Professor
Sanjay Mishra	University of Pittsburgh Department of Surgery Pittsburgh, PA	Research Assistant Professor





Marijn Ford. A model for dynamin assembled into a helix. Dynamin catalyses the final fission step of endocytosis, releasing the vesicle into the cytosol. The GTPase domain is shown in black; GTP binding elements in red and the dynamin stalks are shown in grey.



Faculty Honors, Recognition and Professional Affiliations (Fiscal Year 2013 - 2014)

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

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

Michael Butterworth, Ph.D.
Assistant Professor

Member, American Physiological Society
Member, Elected Secretary, Salt and Water Club
American Society of Nephrology
American Heart Association
Cell and Molecular Physiology New Investigator Award, American Physiological Society

Daniel C. Devor, Ph.D.
Professor

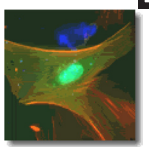
Member, American Physiological Society
Member, Biophysical Society
Member, Mount Desert Island Biological Laboratory

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
Academy of Master Educators (AME), University of Pittsburgh School of Medicine

Georgia Duker, Ph.D.
Assistant Professor

Academy of Master Educators (AME), University of Pittsburgh School of Medicine



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
Member, American Society for Cell Biology
Member at Large, Medical Advisory Council, Cystic Fibrosis Foundation
Member, Salt and Water Club
Hugh Davson Distinguished Lecture, American Physiological Society

Yang Hong, Ph.D.
Associate Professor

Member of Faculty 1000
Research Scholar, American Cancer Society

Vernon Gay, Ph.D.
Associate Professor

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

Adam Kwiatkowski, Ph.D.
Assistant Professor

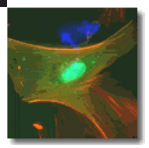
Member, American Society for Cell Biology
American Society for Biochemistry and Molecular Biology

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
Academy of Master Educators (AME), University of Pittsburgh School of Medicine
NIH - Biomedical Faces of Science Mentors

Allyson O'Donnell, Ph.D.
Research Assistant Professor

Member, American Society for Cell Biology
American Society for Biochemistry and Molecular Biology

Kathleen D. Ryan, Ph.D.
Associate Professor

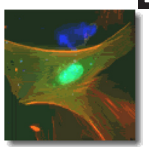
Member, Society for the Study of Reproduction (SSR)
Member, Endocrine Society
Member, Society for Neuroscience

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

American Society for Cell Biology
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
Member, American Physiological Society



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

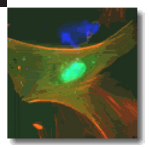
Member, The Pittsburgh Cancer Institute

Christine Wu, Ph.D.
Associate Professor

American Society for Cell Biology (ASCB)
American Society for Mass Spectrometry (ASMS)
Research Society on Alcoholism (RSA)
American Chemical Society (ACS)
American Society for Pharmacology and Experimental Therapeutics (ASPET)

Nathan Yates, Ph.D.
Associate Professor

American Chemical Society
American Society for Mass Spectrometry
The Association for Biomolecular Resource Facilities
United States Human Proteomics Organization



Faculty Presentations (Fiscal Year 2013 - 2014)

Carol Bertrand, Ph.D.
Research Assistant Professor

CFTR-SLC26A9 interactions: Why does delF508 CFTR suppress A9 function? Children's Hospital of Pittsburgh, 2014.

Michael Butterworth, Ph.D.
Assistant Professor

"Regulation of the Epithelial Sodium Channel by microRNAs". Division of Nephrology, University of New Mexico School of Medicine. 2013

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

American Physiological Society, Hugh Davson Distinguished Lecture, EB 2014, San Diego, CA. "Wrestling with CFTR Folding: SUMO enters the ring" April 27, 2014

Adam Kwiatkowski, Ph.D.
Assistant Professor

Senior Vice Chancellor Research Seminar, University of Pittsburgh School of Medicine, Pittsburgh, PA. July 19, 2013.

Cellular Traffic Management Session, Science 2013, University of Pittsburgh, Pittsburgh, PA. October 3, 2013.

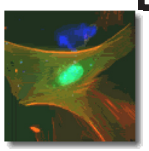
Seminar, Department of Biological Sciences, Lehigh University, Bethlehem, PA. October 10, 2013.

Seminar, Molecular Biophysics/Structural Biology, University of Pittsburgh, Pittsburgh, PA. March 6, 2014.

Imaging Session, McGowan Institute for Regenerative Medicine Retreat, University of Pittsburgh, PA. March 10, 2014.

Nephrotic Syndrome Symposium, University of Pittsburgh School of Medicine, Pittsburgh, PA. March 27, 2014.

Faculty Lecture, Local Traffic 2014 – Pittsburgh Symposium on Intracellular Membrane Traffic, Pittsburgh, PA. May 1, 2014.



Sanford H. Leuba, Ph.D.
Associate Professor

Institute of Biophysics, Indian Academy of Sciences, Bangalore, India, November 2013.

X International Interdisciplinary Scientific Research Congress (IX CIC), Santo Domingo, Dominican Republic, 12-13 June 2014.

Allyson O'Donnell, Ph.D.
Research Assistant Professor

Arrestin' Develoments: New biological functions for the α-arrestin family of trafficking adaptors. Carnegie Mellon University (2013), Pittsburgh

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

Harden Conference "Receptor Tyrosine Kinases", Sheffield, UK, September, 2013

EGFR: Future Directions. Jerusalem, Israel, November 2013

Department of Molecular Cell Biology, University of Birmingham, UK (2013)

NIH, Bethesda (September 2013)

Magee Women's Institute (November, 2013)

Vanderbilt University, Dept. Cell and Dev. Biol. (January, 2014)

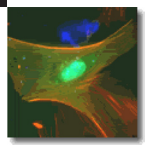
Microbiology and Molecular Genetics, University of Pittsburgh (February, 2014)

Department of Pathology, The Children's Hospital of Philadelphia, UPENN, (March 2014)

Panum Institute, University of Copenhagen, Denmark (May 2014)

Donna B. Stolz, Ph.D.
Associate Professor

Stolz, DB Career Choices with a Biochemistry degree. University of Massachusetts, Amherst. Nov. 2013.



Patrick H. Thibodeau, Ph.D.
Assistant Professor

"Calcium-induced folding and secretion of alkaline protease from *Pseudomonas aeruginosa.*" Midwest Protein Folding Conference, South Bend, IN, 2013.

"NBD-TMD assembly represents a critical step in CFTR biogenesis." North American Cystic Fibrosis Conference, Salt Lake City, UT, 2013.

"Type I protease secretion from *Pseudomonas* and cystic fibrosis." Texas Protein Folding and Function Meeting, Cleveland, TX, 2014.

"Intragenic suppression of PXE-associated ABCC6 mutations: Implication for therapeutic development." PXE International Research Meeting, Bethesda, MD, 2014.

"Molecular mechanisms in PXE: altered protein folding and trafficking of ABCC6," European PXE Research Meeting, Budapest, Hungary, September, 2013

"ENaC regulation by the alkaline protease from *Pseudomonas aeruginosa*," European Cystic Fibrosis Society Basic Science Meeting, St. Julius, Malta, March, 2014.

"More than CFTR: ABC-transporters turned channels and cystic fibrosis." Emory University School of Medicine, July 2013.

Linton Traub, Ph.D.
Associate Professor

'Clathrin coat initiation ... getting it right' Biochemistry and Biophysics Center, NHLBI, NIH, Bethesda, MD. March 2014

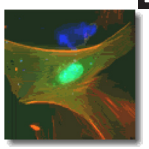
Yong Wan, Ph.D.
Associate Professor

The role of proteolysis in cell cycle, genomic integrity and carcinogenesis. Harvard Medical School. 2014

Interplay between ubiquitylation and arginine methylation in DNA damage response and carcinogenesis. Cold Spring Harbor Laboratory. Protein Modification and Homeostasis Conference. 2014

Crosstalk of posttranslational modification in cell growth, cancer and treatment. 2014 Annual Meeting of Korean Society for Biochemistry and Molecular Biology

Coordination between ubiquitination and deubiquitination in genome stability and cancer formation. Mayo Clinic. 2014



Impact of posttranslational modification in DNA damage response and tumorigenesis. niversity of Southern California 2014

Crosstalk between ubiquitylation and methylation in tumorigenesis. Science 2013 in Pittsburgh

Impact of UPS: from Kruppling development to tumorigenesis. International Symposium of Cancer, Cancer Stem Cell and Therapy. China 2013

Ubiquitin-proteasome system: from biological process to diseases. School of Pharmacy University of Pittsburgh 2013

Crosstalk between protein di-methylation and ubiquitylation in carcinogenesis. SCBA in China. 2013.

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

Imaging the Smallest, the Fastest, and the Invisible: New Solutions to Impossible Barriers; Symposium Moderator Science 2013, University of Pittsburgh, October 2013

Imaging Opportunities, Invited Speaker, Jacksonville Laureate society November 14th 2013 2014

Leaders in microscopy imaging conference, Mannheim Germany, March 18th -21st , invited speaker

Cutting edge probes for in vitro and in vivo imaging, NIH, March 26th-27th Invited Speaker Smaller, faster, deeper: McGowan Retreat Invited Speaker, McGowan Retreat Nemacolin Woodlands March 9th-11th 2014

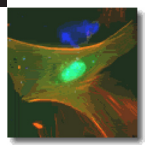
Nathan Yates, Ph.D.
Associate Professor

"The Proteomics Telescope – How Mass Spectrometry Is Changing Our View of the Proteome" LNBio - IV Proteomics Workshop, CNPEM Tutorial Lecture, Campinas Brazil, November 2013

"Differential Mass Spectrometry – Pharmaceutical Applications of Quantitative Proteomics" LNBio - IV Proteomics Workshop, CNPEM Tutorial Lecture, Campinas Brazil, November 2013

"Bridging the Gap Between Nanospray and Clinical Analysis: New Approaches for Automated Proteomics" Pittcon 2014, Chicago, IL, March 2014

US HUPO 10th Annual Conference 2014, Seattle, WA, April 2014



"Co-Expression Network Analysis of Quantitative Proteomics Data: A New Approach for Studying Neuropsychiatric Disease" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore MD, June 2014

"Quantification of Intact and Truncated Stromal Cell-derived factor-1α (SDF-1α) in Circulation by Immunoaffinity Enrichment and Tandem Mass Spectrometry" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore, MD, June 2014

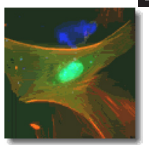
"Antitumor Steroidal Lactone Withaferin A in Human Breast Cancer Cells is Covalently Bound to Cysteine-303 of β-Tubulin" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore, MD, June 2014

"A Cloud Computing Implementation of Differential Mass Spectrometry: A Label-free Method of Proteomic Profiling" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore, MD, June 2014

"CHORUS: A Community-based Solution for the Storage, Analysis, and Exchange of Mass Spectrometry Data and Information" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore, MD, June 2014

"Description of a Novel Multi-column / Multi-dimensional nanoLC-MS/MS Platform for Automated Proteomic Analysis" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore, MD, June 2014

"Rapid Processing of Large Scale Quantitative Proteomics Projects: Integration of Skyline with the CHORUS Cloud" 62nd ASMS Conference on Mass Spectrometry and Allied Topics, Baltimore, MD, June 2014



Peer Reviewed Publications (Fiscal Year 2013-2014)

Meir Aridor, Ph.D.
Associate Professor

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.

David Klinkenberg, Kimberly R. Long, Kuntala Shome, Simon C. Watkins and Meir Aridor (2012) Lipid Signals Direct p125A to Control an Ordered Assembly of Functional ER exit sites (submitted, in revision)

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

Gau D, Ding Z, Baty C, Roy P. Fluorescence resonance energy transfer (FRET)-based detection of profiling-VASP interaction. Cell Mol Bioeng. 2011;4(1):1-8.

Jiang J, Maeda A, Ji J, Baty CJ, Watkins SC, Greenberger JS, Kagan VE. Are mitochondrial reactive oxygen species required for autophagy? Biochem Biophys Res Commun 2011; 412(1):55-60.

Navina S, Acharya C, DeLany JP, Orlichenko LS, Baty CJ Shiva SS, Durgampudi C, Karlsson JM, Lee K, Bae KT, Furlan A, Behari J, Liu S, McHale T, Nichols L, Papachristou GI, Yadav D, Singh VP. Lipotoxicity causes multisystem organ failure and exacerbates acute pancreatitis in obesity. Sci Transl Med 2011; 3(107):107-10.

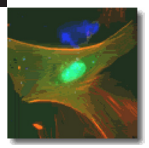
Sachdev U, Cui X, Hong G, Namkoong S, Karlsson JM, Baty CJ, Tzeng E. High mobility group box 1 promotes endothelial cell angiogenic behavior in vitro and improves muscle perfusion in vivo in response to ischemic injury. J Vasc Surg, 2012; 55(1):180-91.

Montecalvo A, Larregina AT, Shufesky WJ, Beer Stolz D, Sullivan ML, Karlsson JM, Baty CJ, Gibson GA, Erdos G, Wang Z, Milosevic J, Tkacheva OA, Divito SJ, Jordan R, Lyons-Weiler J, Watkins SC, Morelli AE. Mechanism of transfer of functional microRNAs between mouse dendritic cells via exosomes. Blood, 2012; 119(3):756-66

Finegold DN*, Baty CJ*, Knicklebein KZ, Persche S, Noon SE, Campbell D, Karlsson JM, Huang D, Kimak MA, Lawrence EC, Meriney SD, Brufsky A, Ferrell RE*. Connexin 47 mutations increase risk for secondary lymphedema following breast cancer treatment. Clinical Cancer Research 2012; 18(8):2382-90.

Kenche H, **Baty CJ**, Vedagiri K, Shapiro SD, Blumental-Perry A. Cigarette smoking affects oxidative protein folding in endoplasmic reticulum by modifying protein disulfide isomerase. FASEB J 2013; 27(3):965-77.

Chu CT, Ji J, Dagda RK, Jiang JF, Tyurina YY, Kapralov AA, Tyurin VA, Yanamala N, Shrivastava IH, Mohammadyani D, Qiang Wang KZ, Zhu J, Klein-Seetharaman J,



Balasubramanian K, Amoscato AA, Borisenko G, Huang Z, Gusdon AM, Cheikhi A, Steer EK, Wang R, **Baty C**, Watkins S, Bahar I, Bayır H, Kagan VE. Cardiolipin externalization to the outer mitochondrial membrane acts as an elimination signal for mitophagy in neuronal cells. Nat Cell Biol. 2013;15(10):1197-1205.

Mattila PE, Venkatesan R, Youssef R, **Baty CJ**,Weisz OA.Rab11a-positive compartments in proximal tubule cells sort fluid phase and membrane cargo. Am J Physiol Cell Physiol 2014; 306(5):C441-9.

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

Liang X, Da Paula AC, Bozóky Z, Zhang H, Bertrand CA, Peters KW, Forman-Kay JD, Frizzell RA. (2012) Phosphorylation-dependent 14-3-3 protein interactions regulate CFTR biogenesis. Mol Biol Cell, 23(6):996-1009.

Holleran JP, Glover ML, Peters KW, Bertrand CA, Watkins SC, Jarvik JW, Frizzell RA. (2012) Pharmacological rescue of the mutant CFTR detected by use of a novel fluorescence platform. Mol Med, 18(1):685-96.

Duvvuri U, Shiwarski DJ, Xiao D, Bertrand C, Huang X, Edinger RS, Rock JR, Harfe BD, Henson BJ, Kunzelmann K, Schreiber R, Seethala RS, Egloff AM, Chen X, Lui VW, Grandis JR, Gollin SM. (2012) TMEM16A induces MAPK and contributes directly to tumorigenesis and cancer progression. Cancer Res, 72(13):3270-3281.

Edinger RS, **Bertrand CA**, Rondandino C, Apodaca GA, Johnson JP, Butterworth MB. (2012) The Epithelial Sodium Channel (ENaC) Establishes a Trafficking Vesicle Pool Responsible for Its Regulation. PLoS ONE, 7(9): e46593.

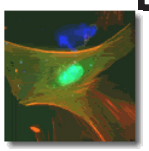
Shiwarski DJ, Shao C, Bill A, Kim J, Xiao D, **Bertrand CA**, Seethala RS, Sano D, Myers JN, Ha P, Grandis J, Gaither LA, Puthenveedu MA, Duvvuri U. (2014) To "Grow" or "Go": TMEM16A Expression as a Switch between Tumor Growth and Metastasis in SCCHN. Clin Cancer Res, 20(17):4673-4688.

Michael Butterworth, Ph.D.
Assistant Professor

Butterworth M.B., Zhang L., Heidrich E., Myerburg M.M., Thibodeau P.H. (2012). Activation of the epithelial sodium channel (ENaC) by the alkaline protease from *Pseudomonas aeruginosa*. *Journal of Biological Chemistry.* (In Press)

Butterworth, M.B.; Edinger, R.S.; Silvis, M.R.; Gallo, L.I.; Liang, X.; Apodaca, G.; Frizzell, R.A. and Johnson, J.P. (2012). Rab11b regulates the trafficking and recycling of the epithelium sodium channel (ENaC). *American Journal of Physiology – Renal.* 302:F581-90. (Highlighted as the featured article in the AJP-Renal Journal's March 2012 podcast)

Edinger, R.S., Bertrand, C.A, Rondandino,C., Apodaca,G.A., Johnson, J.P. and Butterworth, M.B. (2012). The epithelial sodium channel (ENaC) establishes a trafficking vesicle pool responsible for its regulation. *PLOS One* **7** (9):e46593.



Coronnello,C., Hartmaier, R., Arora, A., Huleihel, L., Pandit, K.V., Bais, A.S., Butterworth, M., Kaminski, N., Stormo, G.D., Oesterreich, S., Benos, P.V. (2012). Novel Modeling of Combinatorial miRNA Targeting Identifies SNP with Potential Role in Bone Density. *PLOS Computational Biology*. 8 (12). e1002830.

Butterworth M.B., Zhang L., Heidrich E., Myerburg M.M., Thibodeau P.H. (2012). Activation of the epithelial sodium channel (ENaC) by the alkaline protease from *Pseudomonas aeruginosa*. **Journal of Biological Chemistry. 287(39):32556-65.**

Butterworth, M.B., Zhang, L and Thibodeau, P.H. (2014). Modulation of the Proteolytic Activation of the Epithelial Sodium Channel (ENaC) by a *Pseudomonas aeruginosa* Protease Inhibitor. PLOS One. 9(6):e100313.

Edinger. R.S., Coronnello. C., Bodnar, A.J., LaFramboise, W.A., Benos, P.V., Ho, J., Johnson, J.P and Butterworth, M.B. (2014). Aldosterone regulates microRNAs in the CCD to alter sodium transport. *Journal of the American Society of Nephrology*. (In Press).

Bertuccio, C.A., Lee, S-L., Wu, G., Butterworth, M.B., Hamilton, K.L. and Devor, D.C. (2014). Anterograde trafficking of KCa3.1 in polarized epithelia is Rab1- and Rab8-dependent and recycling endosome-independent. *PLOS One*. 9 (3): e92013

Daniel Devor, Ph.D.
Professor

Millership, J.E., D.C. Devor, K.L. Hamilton, C.M. Balut, J.I. Bruce and I.M. Fearon. Calcium-activated K^+ channels increase cell proliferation independent of K^+ conductance. Am. J. Physiol.: Cell Physiology. 300(4): C792-802, 2011.

Balut, C.M., C. Loch and D.C. Devor. Role of ubiquitylation and USP8-dependent deubiquitylation in the endocytosis and lysosomal targeting of plasma membrane KCa3.1. FASEB J. 25(11): 3938-3948, 2011.

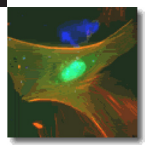
Gao, Y*, C.A. Bertuccio*, C.M. Balut, S.C. Watkins and D.C. Devor. Dynamin- and Rab5-dependent endocytosis of KCa2.3. PLoS ONE (in press). * These authors contributed equally.

Chotoo, C.K., G.A. Silverman, **D.C. Devor*** and C.J. Luke*. A small conductance calcium activated K^+ channel in *C. elegans*, KCNL-2, plays a role in the regulation of the rate of egg-laying. PLoS ONE 8(9): e75869.Doi:10.1371/journal.pone.0075869. 2013.

Bertuccio, C.A., Lee, S-L., Wu, G., Butterworth, M.B., Hamilton, K.L. and Devor, D.C. (2014). Anterograde trafficking of KCa3.1 in polarized epithelia is Rab1- and Rab8-dependent and recycling endosome-independent. *PLOS One*. 9 (3): e92013

Peter F. Drain, Ph.D.
Associate Professor

X. Geng, H. Lou, J. Wang, L. Li, R. G. Perez, and P. Drain. 2011. Alpha-Synuclein Binds the



KATP Channel at Insulin Secretory Granules and Inhibits Insulin Secretion. Am. J. Physiol. Endocrinol. Metab. 300(2): E276-86.

Mihaela Stefan, Rebecca A. Simmons, Suzanne Bertera, Massimo Trucco, Farzad Esni, Peter Drain, Robert D. Nicholls. 2011. Global deficits in development, function, and gene expression in the endocrine pancreas in a deletion mouse model of Prader-Willi syndrome. Am. J. Physiol. Endocrinol. Metab: 300(5): E909-22.

Chu KY, Briggs MJ, Albrecht T, Drain PF, Johnson JD. 2011. Differential regulation and localization of carboxypeptidase D and carboxypeptidase E in human and mouse β-cells. Islets 3(4): 155-65.

Li Ma, Vytautas P. Bindokas, Christine Labno, Jie Wang, Andrey Kuznetsov, Manani Hara, Xuehui Geng, Peter Drain, Christopher J. Rhodes, Donald F. Steiner, and Louis H Philipson. 2012. Non-Crystallized Cargo Protein Shifts Insulin LDCV Exocytosis From Full to Transient Fusion, Traffic, in revision.

Drain P. 2013. ATP and sulfonylurea linkage in the KATP channel solves a diabetes puzzler. Diabetes. 2013 Nov;62(11):3666-8.

Luppi, P., and P. Drain. 2014. Autocrine C-Peptide Mechanism Underlying INS1 Beta Cell Adaptation to Oxidative Stress. Diabetes and Metabolism Research and Reviews, in press.

Marijn Ford, Ph.D.
Assistant Professor

Ford MGJ, Jenni S, Nunnari J. The Crystal Structure of Dynamin. Nature (2011) vol. 477 pp. 561-566.. DOI: 10.1038/nature10441 Pubmed: 21927001 Highlighted: Deconstructing dynamin. Nat. Rev. Mol. Cell Biol. 2011, 623.

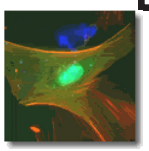
Natalia Varlakhanova Ford, Ph.D.
Research Assistant Professor

Tung PY, Varlakhanova N, Knoepfler PS. Identification of DPPA4 and DPPA2 as a novel family of pluripotency-related oncogenes. Stem Cells (2013) vol. 31 pp. 2330-2242.

Riggs JW, Barrilleaux BL, Varlakhanova N, Bush KM, Chan V, Knoepfler PS. Induced pluripotency and oncogenic transformation are related processes. Stem Cells Dev. (2013) vol. 22 pp. 37-50.

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

K.W., T. Okiyoneda, W.E Balch, I. Braakman, J.L. Brodsky, W.B. Guggion, C.M. Penland, H.B.Pollard, E.J. Sorscher, W.R. Skach, P.J. Thomas, G.L. Lukacs, R.A. Frizzell. CFTR Folding Consortium: methods available for studies of CFTR folding and correction. Methods Mol Biol. 2011;742:335-53.



Butterworth, M.B., R.S. Edinger, M.R. Silvis, L.I. Gallo, X. Liang, G. Apodaca, R.A. Frizzell, J.P. Johnson. Rab11b regulates the trafficking and recycling of the epithelial sodium channel (ENaC). Am J Physiol Renal Physiol. 2012 Mar;302(5):F581-90.

Van Goor, F., S. Hadida, P.D. Grootenhuis, B. Burton, J.H. Stack, K.S. Straley, C.J. Decker, M. Miller,J. McCartney, E.R. Olson, J.J.Wine, R.A. Frizzell, M. Ashlock, P.A. Negulescu. Correction of the F508del-CFTR protein processing defect in vitro by the investigational drug VX-809. Proc Natl Acad Sci USA. 2011 Nov 15;108(46):18843-8.

Liang, X., A.C. Da Paula, Z. Bozóky, H. Zhang, C.A. Bertrand, K.W. Peters, J.D. Forman-Kay, R.A. Frizzell. Phosphorylation-dependent 14-3-3 protein interactions regulate CFTR biogenesis. Mol Biol Cell. 2012 Mar;23(6):996-1009.

Holleran, J.P., M.L. Glover, K.W. Peters, C.A. Bertrand, S.C. Watkins, J.W. Jarvik, R.A. Frizzell. Pharmacological Rescue of the Mutant Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) Detected by Use of a Novel Fluorescence Platform. Mol Med. 2012 May 9;18(1):685-96.

Saxena, A., Y.K. Banasavadi-Siddegowda, Y. Fan, S. Bhattacharya, G. Roy, D.R. Giovannucci, R.A. Frizzell, X. Wang. Human Heat Shock Protein 105/110 kDa (Hsp 105/110) Regulates Biogenesis and Quality Control of Misfolded Cystic Fibrosis Trnasmembrane Conductance Regulator at Multiple Levels. J Biol Chem. 2012 Jun 1;287(23):19158-70.

Ahner, A., X. Gong, B.Z. Schmidt, K.W. Peters, W.M. Rabeh, P.H. Thibodeau, G.L. Lukacs, R.A. Frizzell. Small heat shock proteins target mutant cystic fibrosis transmembrane conductance regulator for degradation via a small ubiquitin-like modifier-dependent pathway. Mol Biol Cell. 2013. 24(2):74-84.

Holleran JP, Zeng J, Frizzell RA, Watkins SC. Regulated recycling of mutant CFTR is partially restored by pharmacological treatment. J Cell Sci. 2013 Jun 15;126 Pt 12:2692-703.

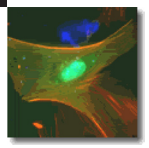
Ahner A, Gong X, Frizzell RA. Cystic fibrosis transmembrane conductance regulator degradation: cross-talk between the ubiquitylation and SUMOylation pathways. FEBS J. 2013 Sep; 280(18):4430-8.

Bozoky Z, Krzeminski M, Muhandiram R, Birtley JR, Al-Zahrani A, Thomas PJ, Frizzell RA, Ford RC, Forman-Kay JD. Regulatory R region of the CFTR chloride channel is a dynamic integrator of phospho-dependent intra- and intermolecular interactions. Proc Natl Acad Sci U S A. 2013 Nov 19; 110(47): E4427-36.

Archana Gangopahyay, Ph.D.
Visiting Research Instructor

Archana Gangopahyay, Max Oran, Eileen M. Bauer, Jeffrey W. Wertz, Suzy A. Comhair, Serpil C. Erzurum, and Philip M. Bauer. Bone Morphogenetic Protein Receptor II Is a Novel Mediator of Endothelial Nitric-oxide Synthase Activation. J Biol Chem. 2011, 286(38):33134-40.

Cruz JA, Bauer EM, Rodriguez AI, Gangopadhyay A, Zeineh NS, Wang Y, Shiva S, Champion



HC, Bauer PM. Chronic hypoxia induces right heart failure in caveolin-1-/- mice. Am J Physiol Heart Circ Physiol. 2012, 302(12):H2518-27

Yang Hong, Ph.D.
Associate Professor

Huang J, Huang L, Chen Y, Austin E, Devor C, Roegiers F, and Hong Y. (2011) Differential regulation of adherens junction dynamics during apical-basal polarization. J. Cell Sci. 124(23):4001-3 (Issue Highlight; Recommended by Faculty 1000). PMID: 22159415

Huang J, Ghosh P, Hatfull GF, and Hong Y. (2011) Successive and targeted DNA integrations in Drosophila genome by Bxb1 and phiC31 integrases. Genetics 189(1):391-5. PMID: 21652525

Zhou W and Hong Y. (2012) Drosophila dPatj plays a supporting role in apical-basal polarity but is essential for viability. Development 139(16):2891-6. PMID: 22791898

Zhou W, Huang J, Watson AM, and Hong Y. (2012) W::Neo: a novel dual-selection marker for high efficiency gene targeting in Drosophila. PLoS ONE 7(2): e31997. PMID: 22348139

Li Z, Lu Y, Xu XL, Maloney R, Zhou W, Hong Y, and Gao FB. (2013) TDP-43 regulates the robustness of the specification of sensory organ precursors through microRNA-9 family in *Drosophila*. (submitted)

Zhou W and Hong Y. (2012) *Drosophila* dPatj plays a supporting role in apical-basal polarity but is essential for viability. Development 139(16):2891-6. PMID: 22791898

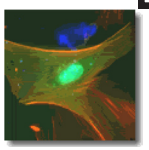
Yuva-Aydemir Y, Xu X-L, Aydemir O, Gascon E, Sayin S, Zhou W, Hong Y, Gao Fen-Biao. (2014) Downregulation of the Host Gene jigr1 by miR-92 Is Essential for Neuroblast Self-Renewal in *Drosophila*. (in submission)

Adam Kwiatkowski, Ph.D.
Assistant Professor

Miller PW, Pokutta S, Ghosh A, Almo SC, Weis WI, Nelson WJ, Kwiatkowski AV. Danio rerio αE-catenin is a monomeric F-actin binding protein with distinct properties from Mus musculus αE-catenin. J Biol Chem. 2013 Aug 2;288(31):22324-22332. PMID: 23788645

Cui C, Chatterjee B, Lozito TP, Zhang Z, Francis RJ, Yagi H, Swanhart LM, Sanker S, Francis D, Yu Q, San Agustin JT, Puligilla C, Chatterjee T, Tansey T, Liu X, Kelley MW, Spiliotis ET, Kwiatkowski AV, Tuan R, Pazour GJ, Hukriede NA, Lo CW. Wdpcp, a PCP protein required for ciliogenesis, regulates directional cell migration and cell polarity by direct modulation of the actin cytoskeleton. PLoS Biol. 2013 Nov;11(11). PMID: 24302887

Hansen SD*, Kwiatkowski AV*, Ouyang C, Liu H, Pokutta S, Volkmann N, Hanein D, Weis WI, Mullins RD, Nelson WJ. Alpha-catenin actin binding domain alters actin filament conformation and regulates binding of nucleation and disassembly factors. Mol Biol Cell. Dec;24(23):3710-20.



PMID: 24068324

Sanford Leuba, Ph.D.
Associate Professor

TM Erb, C Schneider, SE Mucko, JS Sanfilippo, NC Lowry, MN Desai, RS Mangoubi, SH Leuba, PJ Sammak (2011) Paracrine and Epigenetic Control of Trophectoderm Differentiation from Human Embryonic Stem Cells: The Role of Bone Morphogenic Protein 4 and Histone Deacetylases. Stem Cells Dev. Epub ahead of print. PMID: 21204619.

BW Graham, G Schauer, SH Leuba and M Trakselis (2011) Steric Exclusion and Wrapping of the Excluded DNA Strand Occurs Along Discrete External Binding Paths During MCM Helicase Unwinding. Nucleic Acids Research. PMID: 21576224.

L. Lan, S. Nakajima, M. G. Kapetanaki,, C. L. Hsieh, M. Fagerburg, K. Thickman, P. Rodriguez-Collazo, S. H. Leuba, A. S. Levine, and V. Rapic-Otrin (2012) Monoubiquitinated H2A destabilizes photolesion-containing nucleosomes with the concomitant release of the UV-damaged DNA-binding protein E3 ligase. J. Biol. Chem. 287:12036-49. PMID: 22334663.

Fagerburg, M., G. Schauer, K. Thickman, P. Bianco, S. Khan, S. H. Leuba, S. Anand (2012) PcrA-mediated disruption of RecA nucleoprotein filaments – essential role of the ATPase activity of RecA. Nucleic Acids Research 40:8416-24. PMID: 22743269.

Sanford H Leuba, Sean M Carney, Elizabeth M Dahlburg, Rebecca J Eells, Harshad Ghodke, Naveena Yanamala, Grant Schauer and Judith Klein-Seetharaman. (2014) Early integration of the individual student in academic activities: a novel classroom concept for graduate education in molecular biophysics and structural biology. BMC Biophysics 7:6 doi:10.1186/2046-1682-7-6. PMID: 25132964.

Grant D. Schauer, Kelly D. Huber, Sanford H. Leuba, and Nicolas Sluis-Cremer. (2014) Mechanism of allosteric inhibition of HIV-1 reverse transcriptase revealed by single-molecule and ensemble fluorescence. Nucleic Acids Research (in press)

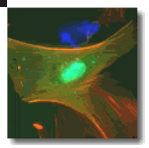
Sandra A. Murray, Ph.D.
Professor

Zhang J, Grindstaff RD, Thai SF, Murray SA, Kohan M, Blackman CF.Chloral hydrate decreases gap junction communication in rat liver epithelial cells. Cell Biol Toxicol. 2011 Jun;27(3):207-16. Epub 2011 Jan 18. PMID: 21243523

Murray, S.A., Nickel, B.M. Gay. V.L. Gap Junction Plaque Endoexocytosis in Adrenal Cells. Mol Cel Endocrinol. Submitted 2012.

Beth M. Nickel, Marie J. Boller, Vernon L. Gay, and. Murray, S.A. Dynamic Imaging of Gap Junction Plaques and the Role of Dynamin in Gap Junction Plaques Endoexocytosis : J Cell Sci 126 Pt 12, 2607-16, 2013.

Nickel, B., Boller, M., Schneider, K., Shakespeare, T., Gay, V. and Murray, S. A. Visualizing the



effect of dynamin inhibition on annular gap vesicle formation and fission. J Cell Sci 126 Pt 12, 2607-16, 2013.

Campbell AG, Leibowitz MJ, Murray SA, Burgess D, Denetclaw WF, Carrero-Martinez FA, Asai DJ. Partnered research experiences for junior faculty at minority-serving institutions enhance their professional success, CBE-Life Sciences Educ, Fall; 12(3):394-402. PMID: 24006388. 2013

Shakespeare, T. I., O'Neil, S.J., Nickel, B., and Murray, S.A. Life and Times of the Annular Gap Junction: Morphological and Dynamic Changes, Submitted, 2013.

Allyson O'Donnell, Ph.D.
Research Assistant Professor

Stevens, J.R., A.F. O'Donnell, T.E. Perry, J.R. Benjamin, C.A. Barnes, G.C. Johnston, and R.A. Singer. (2011) FACT, the Bur kinase pathway, and the histone co-repressor HirC have overlapping nucleosome-related roles in yeast transcription elongation. *PLoS One* 6 (10): e25644.

Minear, S., A.F. O'Donnell*, G. Giaever, C. Nislow, T. Stearns, and M.S. Cyert. (2011) Curcumin inhibits growth of *Saccharomyces cerevisiae* through iron chelation. *Eukaryotic Cell* 10 (11): 1574-81. *Co-first author

Piña, F.J., A.F. O'Donnell, S. Pagant, H.L. Piao, J.P. Miller, S. Fields, E.A. Miller, M..S. Cyert. (2011) Hph1 and Hph2 are novel components of the Sec63/Sec62 posttranslational translocation complex that aid in vacuolar proton ATPase biogenesis. *Eukaryotic Cell* 10 (1): 63-71.

O'Donnell, A.F., L. Huang, J. Thorner, and M.S. Cyert. (2013) A calcineurin-dependent switch controls the trafficking function of α-arrestin Aly1/Art6. *The Journal of Biological Chemistry.* 288(33): 24063-80.

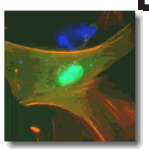
C.G. Alvaro, A.F. O'Donnell*, D.C. Prosser, A.A. Augustine, A. Goldman, J. Brodsky, M.S. Cyert, B. Wendland, and J. Thorner. (2014) Specific α-arrestins negatively regulate *Saccharomyces cerevisiae* pheromone response by down-modulating the G-protein coupled recpetor Ste2. Molecular and Cellular Biology, 2014, May 12.

Kathryn Peters, Ph.D.
Research Assistant Professor

Liang, X., A.C. Da Paula, Z. Bozóky, H. Zhang, C.A. Bertrand, K.W. Peters, J.D. Forman-Kay, and R.A. Frizzell (2012). Phosphorylation-dependent 14-3-3 protein interactions regulate CFTR biogenesis. *Mol. Biol. Cell*. 23: 996-1009.

Holleran, J.P., M.L. Glover, K.W. Peters, C.A. Bertrand, S.C. Watkins, J.W. Jarvik, and R.A. Frizzell (2012). Pharmacological rescue of the mutant cystic fibrosis transmembrane conductance regulator (CFTR(detected by use of a novel fluorescence platform. *Mol. Med*. 18: 685-696.

Ahner, A., X. Gong, B.Z. Schmidt, K.W. Peters, P.H. Thibodeau, G.L. Lukacs, R.A. Frizzell (2013). Small heat shock proteins target mutant CFTR for degradation via a SUMO-dependent



pathway. *Mol. Biol. Cell*. 24: 74-84.

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

Rao, A., Simmons, D. and Sorkin, A. Differential subcellular distribution of endosomal compartments and the dopamine transporter in dopaminergic neurons. Mol. Cell. Neuroscience. (2011) 46, 148-158.

Vina-Vilaseca, A., Bender-Sigel, J., Sorkina, T., Closs, E. I., and Sorkin, A. Protein Kinase C-dependent Ubiquitination and Clathrin-mediated Endocytosis of the Cationic Amino Acid Transporter CAT-1 (2011) 286, 8697–8706.

Duex, J. E., Comeau, L., Sorkin, A.*, Purow, B., and Kefas, B. Usp18 Regulates Epidermal Growth Factor (EGF) Receptor Expression and Cancer Cell Survival via microRNA-7. (2011) J. Biol. Chem. 286(28):25377-86. * Co-corresponding author.

Eden, E., Huang, F., Sorkin, A.*, and Futter, C. R. The role of ubiquitination in EGF receptor trafficking (2012) Traffic. 13: 329-37. * Co-corresponding author.

Rao, A., Richards, T. L., Simmons, D., Zahniser, N. R., and Sorkin, A. Epitope-tagged dopamine transporter knock-in mice reveal rapid endocytic trafficking and filopodia targeting of the transporter in dopaminergic axons. (2012) J *FASEB* J fj.11-196113

Galperin, E., Abdelmoti, L. and Sorkin, A. Shoc2 is targeted to late endosomes and required for Erk1/2 activation in EGF-stimulated cells (2012) *PLoS ONE.* 7: e36469.

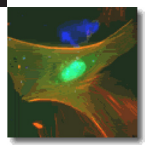
Sorkina, T., Caltagarone, J., and Sorkin, A**.** Flotillins regulate membrane mobility of the dopamine transporter but are not required for its protein kinase C dependent endocytosis. (2013) *Traffic*. epub.

Rogstad, S.M., Sorkina, T., Sorkin, A. and Wu, C. C. Improved Precision of Proteomic Measurements in Immunoprecipitation Based Purifications Using Relative Quantitation. Analytical Chem. 2013. 85:4301-6.

Rao, A., Sorkin, A., and Zahniser, N. R. Mice expressing markedly reduced striatal dopamine transporters exhibit increased locomotor activity, dopamine uptake turnover rate and cocaine responsiveness. *Synapse*. (2013) 67:668-77.

Huang, F., Zeng, X., Kim, W., Balasubramani, M., Fortian, A., Gygi, S. P., Yates, N. A., and **Sorkin, A.** Lysine 63-linked polyubiquitination is required for EGF receptor degradation *Proc. Natl. Acad. Sci. USA* (2013) 110: 15722-7.

Fortian, A. and **Sorkin, A.** Live cell fluorescence imaging reveals high stoichiometry of Grb2 binding to the EGF receptor sustained during endocytosis. (2014) *J. Cell Sci.* 127:432-44. Epub 2013 Nov 20.



Saunders MJ, Block E, **Sorkin A**, Waggoner AS, Bruchez MP. A Bifunctional Converter: Fluorescein Quenching scFv/Fluorogen Activating Protein for Photostability and Improved Signal to Noise in Fluorescence Experiments. Bioconjug Chem. 2014 Aug 6 (Epub).

Donna B. Stolz, Ph.D.
Associate Professor

Xiong, Z, J Cavaretta, L Qu, DB Stolz, D Triulzi, JS Lee. Red blood cell microparticles show altered inflammatory chemokine binding and release upon interaction with platelets. Transfusion. 51(3): 610-621. 2011. PMID: 20738825

Leloup, L. H Shao, YH Bae, B Deasy, D Stolz, P Roy, A Wells. M-calpain activation is regulated by its membrane localization and by its binding to PIP2. J Biol Chem 285(43):33549-33566. PMID 20729206.

Nakao, A, CS Huang, DB Stolz, Y Wang, JM Franks, N Tochigi, TR Billiar, Y Toyoda, E Tseng, KR McCurry. Ex vivo carbon monoxide delivery inhibits intimal hyperplasia in arterialized vein grafts. Cardovasc Res. 89(2):457-63. 2011. PMID 20851811.

Sajithlal, GB, TF McGuire, J Lu, D Beer-Stolz, EV Prochownik. Endothelial cell-like cells derived directly from human tumor xenographs. Int J Cancer 127(10):2268-78. 2010. PMID:20162569

Hoppo, T, J Komori, R Manohar, DB Stolz E Lagasse. Rescue of lethal hepatic failure by Lymph nodes in mice. Gastroenterology. 140(2):656-666. 2011. PMID:21070777

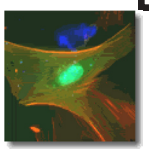
Liang, PH, F Tian, Y Lu, B Duan, DB Stolz, LY Li. Vascular endothelial growth inhibitor(VEGI:TNFSF15) inhibits bone marrow-derived endothelial progenitor cell incorporation into Lewis lung carcinoma tumors. Angiogenesis 14(1):61-8. 2011. PMID: 21188501.

Lee, KW, DB Stolz, Y Wang. Substantial expression of mature elastin in arterial constructs. PNAS 108(7):2705-2010. 2011. PMID: 21282618.

Wilson, ME, N Kota, Y Kim, Y Wang, DB Stolz, PR LeDuc, OB Ozdoganlar. Fabrication and circular microfluidic channels by combining mechanical micromilling and soft lithography. Lab Chip 11(8):1550-1555. 2011. PMID 221399830.

Flint MS, RA Budiu, PN Teng, M Sun, DB Stolz, BL Hood, AM Vlad, TP Conrads. Restraint stress and stress hormones significantly impact T lymphocyte migration and function through specific alterations of the actin cytoskeleton. Brain Behav. Immun. 25(6):1187-1196. 2011. PMID 21426930.

Li H, P Wang, Q Sun, WX Ding, XM Yin, RW Sobol, DB Stolz, J Yu, J Zhang. Following cytochrome c release, autophagy is inhibited during chemotherapy-induced apoptosis by caspase 8-mediated cleavage of Beclin 1. Cancer Res. 71(10):3625-3634. 2011. PMID 21444671.



Bai Q, M Sun, DB Stolz, EA Burton. Major isoform of zebrafish P0 is a 23.5 kDa myelin glycoprotein expressed in selected white matter tracts of the central nervous system. J Comp. Neurol. 519(8):1580-1596. 2011. PMID 21452240.

Park BH, SB Lee, DB Stolz, YJ Lee, BC Lee. Synergistic interactions between heregulin and PPAR gamma agonist in breast cancer cells. J Biol Chem. 286(22):20087-20099. 2011. PMID 21467033.

Ueki S, A Castellaneta, O Yoshida, K Ozaki, M Zhang, S Kimura, K Isse, M Ross, L Shao, DB Stolz, AW Thomson, AJ Demetrs, DA Geller, N Murase. Hepatic B7-H1 expression is essential to control cold ischemia/reperfusion injury after mouse liver transplantation. Hepatology. 54(1):216-228. 2011. PMID 21503939.

Goss JR, DB Stolz, AR Robinson, M Zhang, N Arbujas, PD Robbins, JC Glorioso, LJ Niedernhofer. Premature aging-related peripheral neuropathy in a mouse model of progeria. Mech Ageing Dev In Press. 2011 PMID 21596054

Fischer RT, HR Turnquist, Z Wang, D Beer-Stolz, AW Thomson. Rapamycin-conditioned, alloantigen-pulsed myeloid dendritic cells present donor MHC class I/peptide via the semi-direct pathway and inhibit survival of antigen-specific CD8(+) T cells in vitro and in vivo. Transpl Immunol 25(1):20-26. 2011. PMID 21596137.

Horzempa J, DM O'Dee, DB Stolz, JM Franks, D Clay, GJ Nau. Invasion of erythrocytes by Fracisella tularensis. J Infect Dis 204(1):51-59. 2011. PMID 21628658

Ghonem, N, J Yoshida, DB Stolz, A Humar, TE Starzl N Murase, R Venkataramanan. Treprostinil, a prostacyclin analogue, ameliorates ischemia-reperfusion injury of rat orthotopic liver transplantation. Am J Transplantation. In Press PMID 21668631

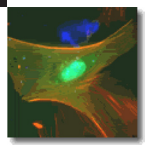
Wickline, ED, PK Awuah, J Behari, M Ross, DB Stolz, SP Monga. Hepatocyte gamma-catenin compensates for conditionally deleted beta-catinin at ahderens junctions. J Hepatology 2011 In Press PMID 21703193

Manohar R, J Komori, L Guzik, DB Stolz, UR Chandran, WA Laframboise, E Lagasse. Identification and expansion of a unique stem cell population from adult mouse gallbladder. Hepatology In Press PMID 21703193

Thomson, AW, DA Geller, C Gandhi, N Murase, AJ Demetris, D Beer-Stolz. Hepatic antigen-presenting cells and regulation of liver transplant outcome. Immunol Res 2011 In Press PMID 21717072

Eum HA, R Vallabhaneni, Y Wang, PA Loughran, D Beer Stolz, TR Billiar. Characterization of DISC formation and TNFR1 translocation to mitochondria in TNF-a-treated hepatocytes. Am J Pathol 2011. In Press. PMID 21741934

Feng H, HJ Kwun, X Liu, O Gjoerup, DB Stolz, Y Chang, PS Moore. Cellular and viral factors regulating merkel cell polyomavirus replication. PLoS One 6(7): e22468. 2011 PMID 21799863.



Feng R, S Li, C Lu, C Andreas, D Beer-Stolz, MY Mapara, S Lentzsch. Targeting the microtubular network as a new anti-myeloma strategy. Mol Cancer Ther 2011 In Press. PMID 21825007

Lee, LY, T Kaizu, H Toyokawa, M Zhang, M Ross, DB Stolz, C Huang, C Gandhi, DA Geller, N Murase. Carbon monoxide induces hypothermia tolerance in kupffer cells and attenuates liver ischemia/reperfusion injury in rats. Liver Transpl. 17(12):1457-1466. 2011 PMID 21850691.

Ji, J, YY Tyurina, M Tang, W Feng, DB Stolz, R Clark, D Meaney, PM Kochanek, VE Kagan, H Bayir. Mitochondrial injury after mechanical stretch of cortical neurons in vitro: Biomarkers of apoptosis and selective peroxidation on anionic phospholipids. J Neurotrauma. 29(5):776-788. 2011. PMID 21895519.

Turnquist HR, Z Zhao, BR Roseborough, Q Liu, A Castellanata, K Isse, Z Wang, M Lang, D Beer Stolz, XX Zheng, AJ Demetris, FY Liew, KJ Wood, AW Thomson. IL-33 expands suppressive DC11b+Gr-int and regulatory T cells including ST2L+Foxp3+ cells and mediates regulatory T cell-dependent promotion of cardiac allograft survival. J Immunol 187(9):4598-4610. 2011, PMID 21949025.

Gregg SQ, V Gutiérrez, AR Robinson, T Woodell, A Nakao, MA Ross, GK Michalopoulos, L Rigatti, CE Rothermel, I Kamileri, George Garinis, D Beer Stolz, LJ Niedernhofer. A mouse model of accelerated liver aging due to a defect in DNA repair. Hepatology, 55(2):609-621. 2012. PMID 21953681

Jaffe M, C Sesti, IM Washington, L Du, N Dronadula, MT Chin, DB Stolz, EC Davis, DA Dichek. Transforming growth factor-beta signaling in myogenic cells regulated vascular morphogenesis, differentiation and matrix synthesis. Arterioscler Thromb Vasc Biol. 32(1); e1-e11. 2012. PMID 21979435

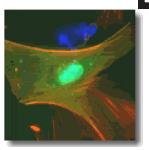
Montecalvo A, AT Larregina, WJ Shufesky, D Beer Stolz, Sullivan, JM Karlsson, CJ Baty, GA Gibson, G Erdos, Z Wang J Milosevic,OA Tkacheva, SJ Divito, R Jordan, J Lyons-Weller, SC Watkins, AE Morelli. Mechanism of transfer of functional microRNAs between mouse dendritic cells via exosomes. Blood. 119(3):756-766. 2012 PMID 22031862.

Li P, Q Du, Z Cao, Z Guo, J Evankovich, W Yan, Y Chang, L Shao, DB Stolz, A Tsung, DA Geller. Interferon-gamma induces autophagy with growth inhibition and cell death in human heptocellular carcinoma (HCC) cells through interferon-regulatory factor-1 (IRF-1). Cance Lett.314(2):213-222. 2011. PMID 22056812.

Hang TC, Lauffenburger, LG Griffith and DB Stolz. Lipids promote survival, proliferation, and maintenance of differentiation of rat liver sinusoidal endothelial cells in vitro. Am J Physiol Gastrointestinal Liver Physiol 302(3):G375-388. 2012 PMID 22075778.

Tanaka A, Y Jin, SJ Lee, M Zhang, HP Kim, DB Stolz, SW Ryter, AM Choi. Hyperoxia induced LC3B interacts with the Fas apoptotic pathway in epithelial cell death. Am J Respir Cell Mol Biol 46(4):507-14. 2012. PMID 22095627

Liu L, GR Yannam, T Nishikawa, T Yamamoto, H Basma, R Ito, M Nagaya, J Dutta-Muscato,



DB Stolz, F Duan, KH Kaestner, Y Vodovotz, A Soto-Gutierrez, IJ Fox. The microenvironment in hepatocyte regeneration and function in rats with advanced cirrhosis. Hepatology 55(5):1529-29. 2012. PMID 22109844.

Zhao, Y, NS Mangalmurti, Z Xiong, B Prakash, F Guo, DB Stolz, JS Lee. Duffy antigen receptor mediates chemokine endocytosis though a macropinocytosis-like process in endothelial cells. PLoS One 6(12):e29624. 2011 PMID: 22216333.

Bernard ME, H Kim, MS Rajagopalan B Stone, U Salimi, JC Rwigema, MW Epperly, H Shen, JP Goff, D Franicola, T Dixon, S Cao, X Zhang, H Wang, DB Stolz, JS Greenberger. Repopulation of the irradiation damaged lung with bone marrow-derived cells. In Vivo. 26(1):9-18. PMID: 22210711.

Ekser, B, E Klein, J He, DB Stolz, GJ Echeverri, C Long, CC Lin, M Ezzelarab, H Hara, M Veroux, D Ayares, DKC Cooper, B Gridelli. Genetically-engineered pig-to-baboon liver xenotransplantation: Histopathology of xenographs and native organs. PLoS ONE 7(1):e29720. 2012. PMID 22247784.

Ozaki KS, S Kimura, MA Nalesnik, RM Sico. M Zhang, S Ueki, MA Ross, DB Stolz, N Murase. Loss of renal dendritic cells and activation of host adaptive immunity are long-term effects of ischemia/reperfusion injury following syngeneic kidney transplantation. Kidney Int. 2012. PMID 22278023

Sun, Q, T Kawamura, K Masutani, X Peng, Q Sun, DB Stolz, JP Pribis, TR Billiar, X Sun, CA Bermudez, Y Toyoda, A Nakao. Oral intake of hydrogen-rich water inhibits intimal hyperplasia in arterialized vein grafts in rats. Cardiovasc Res. 94(1):144-153. 2012 PMID 22287575

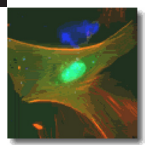
Ikenouchi, J, M Suzuki, K Umeda, K Ikeda, R Taguchi, T Kobayashi, DB Stolz, M Umeda. Lipid polarity is maintained in the absence of tight junctions, J Biol Chem. 287(12):9525-9533. 2012. PMID 22294698.

Rapireddy S, L Nhon, RE Meehan, J Franks, DB Stolz, D Tran, ME Selsted, DH Ly. RTD-1 mimic containing yPNA scaffold exhibits broad spectrum antibacterial activities. J Am Chem Soc. 134(9):4041-4044. 2012 PMID: 22332599.

Donker, RB, JF Mouillet, T Chu, CA Hubel, DB Stolz, AE Morelli, Y Sadovsky. The expression profile of C19MC microRNAs in primary human trophoblast cells and exosomes. Mol Hum Reprod. 2012. In press PMID 22383544.

Dangi, A. TL Sumpter, S Kimura, DB Stolz, N Murase, G Raimondi, Y Vodovotz, C Huang, AW Thomson, CR Gandhi. Selective expansion of allogeneic tegulatory T-cells by hepatic stellate cells: role of endotoxin and implications for allograft tolerance. J. Immunology 188(8):3667-77. 2012. PMID 22427640.

Cihil KM, P Ellinger, A Fellows, D Beer Stolz, DR Madden, Swiatecka-Urban, A. DAB2 facilitates AP-2 independent recruitment of CFTR to endocytic vesicles in polarized human airway epithelial



cells. J Biol Chem 287(18):15087-99. 2012. PMID 22399289.

Liang X, ME de Vera, WJ Buscher, A Romo de Vivar Chavez, P Loughran, D Beer-Stolz, P Basse, T Wang, B van Houten, HJ Zeh, M Lotze. Inhibiting autophagy during interleukin 2 immunotherapy promotes long-term tumor regression. Cancer Res 72(11):2791-801. 2012. PMID 22472122

Rodrigues, M, O Turner, D Stolz, L Griffith, A Wells. Production of reactive oxygen species by multipotent stromal cells/mesenchymal stem cells upon exposure to Fas Ligand. Cell Transplantation, 2012 in press. PMID 22526333

Orlichenko L, DB Stolz, P Noel, J Behari, S Liu, VP Singh. ADP-ribosylation factor-1 regulates trypsinogen activation via organellar trafficking of pro-cathepsin B and autophagic maturation in acute pancreatitis. J Biol Chem 2012 In Press 22570480

Evankovich J, R Zhang, JS Cardinal, L Zhang,J Chen, H Huang, D Beer-Stolz, TR Biliar, MR Rosengart, A Tsung. Calcium/Calmodulin-dependent protein kinase IV limits organ damage in hepatic ischemia/reperfusion injury through induction of autophagy. Am J Physiol Gastrointest Liver Physiol 303(2):G189-198. 2012 PMID 22575222

Graves JA, Y Wang, S Sims-Lucas, E Cherok, K Rothermund, MF Branca, J Elster, D Beer-Stolz, B Van Houten, J Vockley, EV Prochownik. Mitochondrial structure, function and dynamics are temporally controlled by c-Myc. PLoS One 2012:7(5):e37966.

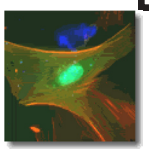
Ekser B, CC Lin, C Long, GJ Echeverri, H Hara, M Ezzelarab, VY Bogdanov, DB Stolz, K Enjyoji, SC Robson, D Ayares, A Dorling DK Cooper, B Gridelli. Potential factors influencing the development of thrombocytopenia and consumptive coagulopathy after genetically modified pig liver xenotransplantation. Transpl Int. 2012. In press. PMID 22642260.

Graves, JA Y Wang, S Sims-Lucas, E Cherok, K Rothermund, MF Branca, J Elster, D Beer-Stolz, B Van Houten, J Vockley, EV Prochownik. Mitochondrial structure, function and dynamics are temporally controlled by c-Myc. PLoS One 7(5):e37699. 2012 PMID: 22629444.

Huang Y, J Lu, X Gao, J Li, W Zhao, M Sun, DB Stolz, R Venkataramanan, LC Rohan, S Li. PEG-derived embelin as a dual functional carrier for the delivery of Paclitaxil. Bioconjug. Chem. 2012 In Press. PMID 22681537.

Tilstra, JS, AR Robinson, J Wang, SQ Gregg, CL Clauson, DP Reay, LA Nasto, CM St. Croix, A Usas N Vo, J Huard, PR Clemens, DB Stolz, DC Guttridge, SC Watkins, GA Garinis, Y Wang, LJ Niedernhofer, PD Robbins. NF-kB inhibition delays DNA damage-induced senescence and aging in mice. J Clin Invest. 122(7):2601-12. 2012. PMID 22706308_

Stefanovic-Racic M, Yang X, Turner MS, Mantell BS, Stolz DB, Sumpter TL, Sipula IJ, Dedousis N, Scott DK, Morel PA, Thomson AW, O'Doherty RM. Dendritic cells promote macrophage infiltration and comprise a substantial portion of obesity-associated increases in



CD11c+ cells in adipose tissue and liver. Diabetes. 2012 Jul In press. PMID: 22851575

Mo L, Y Wang, L Geary, C Corey MJ Alef, D Beer-Stolz, BS Zuckerbraun, S Shiva. Nitrite activates AMP kinase to stimulate mitochondrial biogenesis independent of soluble guanylate cyclase. Free Radic Biol Med. 53(7):1440-1450. 2012. PMID 22892143

Phillips, PM, LJ Phillips, HA Saad, MA Terry, DB Stolz, C Stoeger J Franks, D Davis-Boozer, "Ultrathin" DSAEK tissue prepared with a low-pulse energy, high frequency femtosecond laser. Cornea 32(1):81-86. 2013. PMID 22895047

Tanaka Y, N Shigemura, T Kawamura, K Noda, K Isse, DB Stolz, Y Toyoda, CA Bermudez, J Lyons-Weller, A Nakao. Profiling molecular changes induced by hydrogen treatment of lung allographs prior to procurement. Biochem Biophys Res Comm. 425(4):873-879. 2012. PMID 22902635

Sumpter TL, A Dangi, BM Matta, C Huang, DB Stolz, Y Vodovotz, AW Thomsson, CR Gandhi. Hepatic stellate cells undrmine the allostimulatory function of liver myeloid dendritic cells via STAT3-dependent induction of IDO. J Immunol. 189(8):3848-3858. 2012. PMID 22962681

El Filali, EE, J Hiralall, HA van Veen, DB Stolz, J Seppen. Human liver endothelial cells, but not macrovascular or microvascular endothelial cells engraft in the mouse liver. Cell Transplant. In Press. PMID 23044355

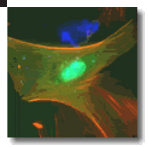
Ding WX, F Guo, HM Ni, A Bockus, S Manley, DB Stolz, EL Eskelinen, H Jaeschke, XM Yin. Parkin and mitofusins reciprocally regulate mitophagy and mitochondrial spheroid formation. J Biol Chem 287(50):42379-42388. 2012. PMID 23095748.

Whitcomb DC,…..D Stolz, R Sutton, FU Weiss, CM Wilcox, NO Zarnescu, SR Wisniewski, MR McConnell, K Roeser, MM Barmada, D Yadav, B Devlin. Common genetic variants in the CLDN2 and PRSS1-PRSS2 loci alter risk for alcohol related and sporatic pancreatitis. Nature Genetics. 44(12):1349-1354. 2012 PMID 23143602.

Munich, S, S Sobo-Vujanovic, WJ Buchser, D Beer-Stolz, NL Vujanovic. Dendritic cell exosomes directly kill tumor cells and activate natural killer cells via TNF superfamily ligands. Oncoimmunology 1(7):1074-1083. 2012 PMID 23170255

Zhang M, S Ueki, S Kimura, O Yoshida, A Castellaneta, KS Ozaki, AJ Demetris, M Ross, Y Vodovotz, AW Thomson, D Beer Stolz, DA Geller, N Murase. Roles of Dendritic cells in murine hepatic warm and liver transplantation-induced cold ischemia/reperfusion injury. Hepatology. 57(4):1585-1596. 2013. PMID 23184590.

Lee, SM JN McLaughlin, DR Frederick, L Zhu, K Thambiayya, KJ Wasserloos, I Kaminski, LL Pearce, J Peterson, J Li, JD Latoche, OM Peck Plamer, DB Stolz, CL Fattman, JF Alcorn, TD Oury, DC Angus, BR Pitt, AM Kaynar. Metallothionein-indice zinc partitioning exacerbates hyperoxic acute injury. Am J Phyiol Lung Cell Mol Physiol 304(5):L350-360. 2013



PMID:23275622.

Zhang X, J Lu, Y Huang, W Zhao, Y Chen, J Li, X Gao, Venkataramanen M Sun, DB Stolz, L Zhang, S Li. PEG-Farnesylthiossalicylate conjugate as a nanocellular carrier for delivery of Paclitaxel. Bioconjug Chem 24(3):464-472. 2013 PMID 23425093.

Nace, GW, H Huang, JR Klune, RE Eid, BR Roseborough, S Korff, S Li, RA Shapiro, DB Stolz, CP Sodhi, DJ Hackham, DA Geller, TR Billiar, A Tsung. Cellular specific role of Toll-like receptor 4 in hepatic ischemia-reperfusion injury. Hepatology in press PMID: 23460269.
Loughran, PA, DB Solz, SR Barrick, DS Wheeler, PA Friedman, RA Ruchubinski, SC Watkins, TR Billiar. PEX7 and EPB50 target iNOS to the peroxisome. Nitric Oxide. 31:9-19. 2013. PMID 23474170.

Neal MD CP Sodhi, M Dyer, BT Craig, M Good, H Jia, I Yazji, A Afrazi, WM Richardson, D Beer-Stolz, C Ma, T Prindle, Z Grant, MF Branca, Jozolek, DJ Hackam. A critical role for TLR4 induction in autophagy in the regulation of enterocyte migration and the pathogenesis of necrotiszing enterocolitis. J Immunol In Press PMID 23455503.

Wickline ED, Y Du, DB Stolz, M Khan, SP Monga. g-catenin at adherens junctions: mechanism and biologic implications in hepatocellular cancer after b-catenin knockdown. Neoplasia 15(4):421-434. 2013. PMID: 23555187.

Schwartzman D, Schoedel, DB Stolz E Di Martino. Morphological and mechanical examination of the atrial “intima” Europace 2013 PMID:23608029. In press.

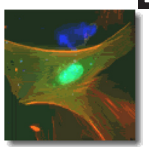
Zhang H, DB Stolz, G Chalasani, AW Thomson. Hepatic B cells are readily activated by TLR4 ligation and secrete less IL-10 than lymphoid tissue B cells. Clin Exp Immuno 2013 PMID: 23617623.

Han J, W Hou, C Lu, LA Goldstein, DB Stolz, SC Watkins, H Rabinowich. Interaction between Her2 and Beclin-1 underlies a new Mechanism of Reciprocal Regulation. J Biol Chem. 288(28):20315-20325 2013. PMID 23703612.

Sarin, M, Y Wang, F Zhang, K Rothermund, Y Zhang, J Lu, S Sims-Lucas, D Beer-Stolz, BE Van Houten, J Vockley, ES Goetzman, J Anthony Graves, EV Prochownik. Alterations in c-Myc phenotypes resulting from dynamin-related protein 1 (Drp1) mediated mitochondrial fission. Cell Death Dis. Jun 13;4:e670. 2013. PMID: 23764851

Delorme-Axford, E RB Donker, JF Mouillet, T Chu, A Bayer, Y Ouyang, T Wang, DB Stolz, SN Sarkar, AE Morelli, Y Sadovsky, CB Coyne. Human Placental trophoblasts confer viral resistance to recipient cells. PNAS 110(29):12048-12053. 2013 PMID: 23818581

Mishra, V, R Cline, P Noel, J Karlsson, CJ Baty, L Orlichenko, K Patel, RN Trivedi, SZ Husain, C Acharya, C Durgampudi, DB Stolz, S Navina, VP Singh. Src-dependent pancreatic acinar injury can be initiated independent of an increase in cytosolic calcium. PLoS One 8(6):e66471 2013



PMID: 23824669.

Sitnick, MT MK Basantani, L Cai, G Schoiswohl, CF Yazbeck, G Distefano, V Ritov, JP Delaney, R Schreiber, DB Stolz, NP Gardner, PC Kienesburger, T Pulinilkunnil, R Zechner, BH Goodpaster, P Coen, EE Kershaw. Skeletal muscle triacylglycerol hydrolysis does not influence metabolic complications of obesity. Diabetes, In press. PMID: 23835334.

Chi Sabins, N, JL Taylor, KP Fabian, LJ Appleman, JK Maranchi, DB Stolz, WJ Storkus. DLK1: A novel target for immunotherapeutic remodeling of the tumor blood vasculature. Mole Ther 2013. In Press PMID: 23896726.

Huang, H, HW Chen, J Evankovich, W Yan, BR Roseborough, GW Nace, Q Ding, P Loughran, **D Be**er-Stolz, TR Billiar, CT Esmon, A Tsung. Histones activate the NLRP3 inflammasome in Kupffer cells during sterile inflammatory Liver injury. J Immuno. 191(5):2665-2679. 2013. PMID: 23904166

Vyas, AR, ER Hahm, JA Arlotti, S Watkins, D Beer-Stolz, D Desai, S Amin, SV Singh. Chemoprevention of Prostate cancer by D,L-Sulforaphane is augmented by pharmacological inhibition of autophagy. Cancer Res. 73(19):5985-5995. 2013. PMID: 23921360

Lee, S T Yamada, T Osako, DB Stolz, M Abe, MT McCurry, N Murase, J Kotani, A Nakao. Recipient hyperbilirubinaemia protects cardiac graft in rat heterotopic heart. Eur J Cardiothorac Surg. 45(3):481-488.2014. PMID: 23946500.

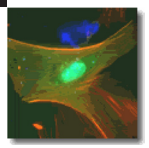
ZhaoY, Z Xiong, EJ Lechner, PA Klenotic, BJ Hamburg, M Hulver, A Khare, T Oriss, N Mangalmurti, Y Chan, Y Zhang, MA Ross, DB Stolz, MR Rosengart, J Pilewski, P Ray, A Ray, RL Silverstein, JS Lee. Thrombospondin-1 triggers macrophage IL-10 production and promotes resolution of experimental lung injury. Mucosal Immunol. 7(2):440-448. 2014. PMID 24045574.

Stewart RK, A Dangi, C Huang, N Murase, S Kimura, DB Stolz, GC Wilson, AB Lentsch, CR Gandhi. A novel mouse model of depletion of stellate cells clarifies their role in ischemia/reperfusion- and endotoxin-induced acute liver injury. J Hepatol. 60(2):298-305. 2014. PMID 24060854.

Allen RA, W Wu, M Yao, D Dutta, X Duan, TN Bachman, HC Champion, DB Stolz, Am Robertson, K Kim, JS Isenberg, Y Wang. Nerve regeneration and elastin formation within poly(glycerol sebacate)-based synthetic arterial grafts one-year post-implantation in a rat model. Biomaterials 35(1):165-173. 2014 PMID:24119457

Li HH, J Li, KJ Wasserloos, C Wallace, MG Sullivan, PM Bauer, DB Stolz, JS Lee, SC Watkins, CM St Croix, BR Pitt LM Zhang. Caveolae-dependent and independent uptake of albumin in cultured rodent endothelial cells. PLoS One 8(11):e81903. 2013. PMID:24312378

Han J, W Hou, LA Goldstein, DB Stolz, SC Watkins, H Rabinowich. A complex between Atg7 and caspase-9: a novel mechanism of cross-regulation between autophagy and apoptosis. J Biol Chem 289(10):6485-97. 2014 PMID: 24362031



Huang H, HW Chen J Evankovich, W Yan, BR Roseborough, GW Nace, Q Ding, P Loughran, D Beer-Stolz, TR Billiar, CT Esmon, A Tsung. Histones activate the NLRP3 inflammasome in Kupffer cells during sterile inflammatory liver injury. Hepatology 59(5):1984-1997. 2014. PMID: 24375466

Marrone AK, DB Stolz, SI Bastacky, D Kostka, AJ Bodnar, J Ho. MicroRNA-17~92 is required for nephrogenesis and renal function. J Am Soc Nephrol. 25(7):1440-1452. PMID: 24511118

Wheeler, SE, JT Borenstein, AM Clark, MR Ebrahimhkani, IJ Fox, L Griffith, W Inman, D Lauffenburger, T Nguyen, VC Pillai, R Prantl-Braun, DB Stolz, D Taylor, T Ulrich, R Venkataramanan, A Wells, C Young. All Human microphysical model of Metastasis Therapy. Stem Cell Res Ther. 4 Suppl 1:S11. doi:10.1186/scrt372 epub 2013 PMID 24565274.

Stolz, DB, Sims-Lucas. Unwrapping the origins and roles of the renal endothelium. Pediatr Nephrol. 2014 in press. PMID:24633402

Lavasani M, SD Thompson, JB Pollett, A Usas, A Lu, DB Stolz, KA Clark, B Sun, B Peault, J Huard. Human muscle derived stem/progenitor cells promote functional murine peripheral nerve regeneration. J Clin Invest. 124(4):1745-1756. 2014. PMID 24642464

Zhang Y, Ghazwani M, J Li, M Sun, DB Stolz, F He, J Fan, W Xie, S Li. MiR-29b inhibits collagen maturation in hepatic stellate cells through down regulating the expression of HSP47 and lysyl oxidase. Biochem Biophys Res Commun 446(4):940-4 2014.PMID: 24650661.

Griffith, LG, A Wells, DB Stolz. Engineering Liver. Hepatology in press PMID: 24668880.

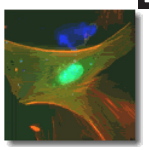
Bowen, WC, AW Michalopoulos, A Orr, MQ Ding, DB Stolz, GK Michalopoulos. Development of a chemically defined medium and discovery of new mitogenic growth factors for mouse hepatocytes: Mitogenic effects of FGF1/2 and PDGF. PLoS One 9(4):e95487. 2014. PMID:24743506.

Norris, CA, M He, LI Kang, MQ Ding, JE Radder, MM Haynes, Y Yang, S Parajpe, WC Bowen, A Orr, GK Michalopoulos, DB Stolz, WM Mars. Sythesis of IL-6 by hepatocytes is a normal response to common hepatic stimuli. PLoS One 9(4):e96053 2014. PMID: 24763697.

Tanaka Y, N Shigemura, K Noda, T Kawamura, K Isse, DB Stolz, CA Bermudez. Optimal lung inflation techniques in a rat lung transplantation model: A revisit. Thorac Cardiovasc Surg. 62(5):427-433. 2014. PMID 24788707.

Clark AM, Wheeler SE, Taylor DP, Pillai VC, Young CL, Prantil-Baun R, Nguyen T, Stolz DB, Borenstein JT, Lauffenburger DA, Venkataramanan R, Griffith LG, Wells A. A microphysiological system model of therapy for liver micrometastasis. Exp Biol Med. 239(9):1170-1179. 2014. PMID: 24821820.

Long OS, JA Benson, JH Kwak, CJ Luke, SJ Gosai, LP O'Reilly, Y Wang, J Li, AC Veticam MT Meidel, DB Stolz, SC Watkins, S Zuchner, DH Perlmutter, GA Silverman, SC Pak. A C. elegans



model of human a1-antitrypsin deficiency links components of the RNAi pathway to misfolded protein turnover. Hum Mol Genet in press PMID: 24838286.

Qian W, J Wang, V Roginskaya, LA McDermott, RP Edwards, DB Stolz, F Lliambi, DR Green, B Van Houten. Novel combination of mitochondrial division inhibitor 1 (mdivi-1) and platinum agents produces synergistic pro-apoptotic effect in drug resistant tumor cells. Oncotarget. June 30:5(12):4180-4194. 2014. PMID: 24952704.

Ambrosio F, E Brown, D Stolz, R Ferrari, B Goodpaster, B Deasy, G Distefano, A Roperti, A Cheikhi, Y Garciafigueroa, A Barchowsky. Arsenic induces sustained impairment of skeletal muscle and muscle progenitor cell ultrastructure and bioenergentics. Free Radic Biol Med 574C:64-73. 2014. PMID: 24960579.

Avin KG, PM Coen, W Huang, DB Stolz, GA Sowa, JJ Dube, BH Goodpaster, RM O'Doherty, F Ambrosio. Skeletal muscle as a regulator of the longevity protein, Klotho. Front Physiol Jun 17;5:189. 2014. PMID: 24987372.

Patrick H. Thibodeau, Ph.D.
Assistant Professor

Zhang L, and Thibodeau PH. (2012) Calcium induced folding and stabilization of the *Pseudomonas aeruginosa* alkaline protease. *JBC*. 287:4611-4322.

Butterworth MB, Zhang L, Heidrich H, Myerburg MM, and Thibodeau PH, (2012) Activation of the epithelialc sodium chanel (ENaC) by the alkaline protease from *Pseudomonas aeruginosa*. *JBC*. 287(39):32556-65.

Ahner A, Gong X, Schmidt BZ, Peters KW, Rabeh WM, Thibodeau PH, Lukacs GL, Frizzell RA. (2013) Small heat shock proteins target mutant cystic fibrosis transmembrane conductance regulator for degradation via a small ubiquitin-like modifier-dependent pathway. *Mol Biol Cell*. 24(2):74-84.

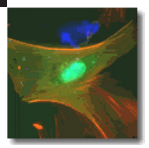
Zhe X, Pissarra LS, Liu J, Farinha CM, Cai Z, Thibodeau PH, Amaral MD and Sheppard DN. The CFTR revertant mutation 4RK confers ATP-dependence to the cystic fibrosis mutant G551D without rescuing its gating defect. *Submitted to J. Gen. Physiol.*

Xue P, Crum CM, and Thibodeau PH. (2014) Regulation of ABCC6 biosynthesis and trafficking by a conserved C-terminal PDZ-like sequence. *PLoSOne*. 9(5):e97360.

Butterworth MB, Zhang L, Liu X, Shanks RMQ, Thibodeau PH. (2014) Regulation of ENaC activity by bacterial metalloproteases and inhibitors. *PLoSOne*. 9(6):e100313.

Linton M. Traub, Ph.D.
Associate Professor

Bertelsen, V., M. M. Sak, K. Breen, L. M. Traub, E. Stang and I. H. Madshus, A chimeric pre- ubiquitinated EGF Receptor is constitutively endocytosed in a clathrin-dependent, but ki-



nase- independent manner. *Traffic* 12: 507-20, 2011.

Umasankar, P.K., S. Sanker, J.R. Thieman, S. Chakraborty, B. Wendland, M. Tsang and **L.M.Traub**. Distinct and separable activities of the endocytic clathrin coat components Fcho1/2 and AP-2 in developmental patterning. *Nature Cell Biol.* **14**: 488-501, 2012.

Jha, A., S.C. Watkins and **L.M. Traub**. The apoptotic engulfment protein Ced-6 participates in clathrin-mediated yolk uptake in *Drosophila* egg chambers. *Mol. Biol. Cell* **23**: 1742-1764, 2012.

Mitra, S., S. Lukianov, W.G. Ruiz, C.C. Cosentino, S. Sanker, **L.M. Traub,** N. Hukreide and G. Apodaca. Requirement for a uroplakin 3a-like protein in the development of zebrafish pronephric tubule epithelial cell function, morphogenesis, and polarity. *PLoS ONE* **7**: e41816, 2012.

Chakraborty, S., P.K. Umasankar, G.M. Preston, P. Khandelwal, G. Apodaca, S.C. Watkins and **L.M. Traub.** A phosphotyrosine switch for cargo sequestration at clathrin-coated buds. *J. Biol. Chem*. **289**: 17497, 2014.

Yong Wan, Ph.D.
Associate Professor

Liu YN, Abou-Kheir W, Yin JJ, Fang L, Hynes P, Casey O, Hu D, Wan Y, Seng V, Sheppard-Tillman H, Martin P, Kelly K. (2011) Critical and reciprocal regulation of KLF4 and SLUG in TGFβ-initiated prostate cancer EMT. *Mol Cell Biol*. Dec 27. PMID: 22203039

Liu W., Zong W., Wu G., Liu X., and Wan Y. (2011). Turnover of BRCA1 Involves in Radiation-Induced Apoptosis. *PLoS ONE* Dec 31;5(12):e14484 PMID: 21217819

Zhang L., Fujita T., Wu G., Xiao X. and Wan Y. (2011). Phosphorylation of Anaphase-Promoting Complex Is Involved in TGF-β Signaling Pathway. *J Biol Chem.* Jan 5. PMID: 21209074

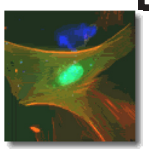
Hu D., Liu W., Wu. G and Wan Y. (2011). Nuclear translocation of Skp2 facilitates its destruction in response to TGF-β signaling. *Cell Cycle* Jan 15;10(2). PMID: 21212736

Hu D. and Wan Y. (2011). Regulation of Krüppel-like Factor 4 (KLF4) by APC pathway in TGF-β signaling. *J Biol Chem* Dec 22. PMID: 21177849

Gamper A., Kim J., Qiao X. Zhang L., DeSimone C., Rathmell W.K and Wan Y. (2012). Regulation of KLF4 Turnover Reveals an Unexpected Tissue Specific Role of pVHL in Tumorigenesis. *Mol Cell* Jan 27. PMID: 22284679

Hu D., Zhou Z., Davidson N.E., Huang Y. and Wan Y. (2012). Novel insight into KLF4 proteolytic regulation in estrogen signaling and breast carcinogenesis. *J Biol Chem.* Mar 2 PMID:22389506

Zhou Z., Chao J., Zhang L., Takeo F., Kim H., Huang Y., Liu Z. and Wan Y. (2013) Regulation of Rad17 turnover unveils an impact of Rad17-APC cascade in breast carcinogenesis and treatment. *J Biol Chem* 288(25):18134-45. PMID:23637229



Vasilatos S.N., Katz T.A., Oesterreich S, Wan Y, Davidson N.E. and Huang Y. 2013. Crosstalk between LSD1 and HDACs Mediates Anti-tumor Efficacy of HDAC Inhibitors in Human Breast Cancer Cells. *Carcinogenesis* (Epub in ahead of print) PMID: 23354309

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

Bernal PJ, Bauer EM, Cao R, Maniar S, Mosher M, Chen J, Wang QJ, Glorioso JC, Pitt BR, Watkins SC, St Croix CM. A Role for Zinc in Regulating Hypoxia-Induced Contractile Events in Pulmonary Endothelium. Am J Physiol Lung Cell Mol Physiol. 2011 Mar 4. [Epub ahead of print] PubMed PMID: 21378023.

O'Reilly LP, Watkins SC, Smithgall TE. An unexpected role for the clock protein timeless in developmental apoptosis. PLoS One. 2011 Feb 17;6(2):e17157. PubMed PMID: 21359199; PubMed Central PMCID: PMC3040764.

Zhao X, Bose A, Komita H, Taylor JL, Kawabe M, Chi N, Spokas L, Lowe DB, Goldbach C, Alber S, Watkins SC, Butterfield LH, Kalinski P, Kirkwood JM, Storkus WJ. Intratumoral IL-12 Gene Therapy Results in the Crosspriming of Tc1 Cells Reactive Against Tumor-associated Stromal Antigens. Mol Ther. 2010 Dec 28. [Epub ahead of print] PubMed PMID: 21189473.

Camirand G, Li Q, Demetris AJ, Watkins SC, Shlomchik WD, Rothstein DM, Lakkis FG. Multiphoton Intravital Microscopy of the Transplanted Mouse Kidney. Am J Transplant. 2011 Aug 11. doi: 10.1111/j.1600-6143.2011.03671.x. [Epub ahead of print] PubMed PMID: 21834913

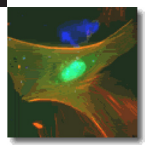
Ardura JA, Wang B, Watkins SC, Vilardaga JP, Friedman PA. Dynamic Na+-H+ exchanger regulatory factor-1 association and dissociation regulate parathyroid hormone receptor trafficking at membrane microdomains. J Biol Chem. 2011 Aug 8. [Epub ahead of print] PubMed PMID: 21832055.

Jiang J, Maeda A, Ji J, Baty CJ, Watkins SC, Greenberger JS, Kagan VE. Are mitochondrial reactive oxygen species required for autophagy? Biochem Biophys Res Commun. 2011 Jul 22. [Epub ahead of print] PubMed PMID: 21806968.

Shields KJ, Stolz D, Watkins SC, Ahearn JM. Complement proteins C3 and C4 bind to collagen and elastin in the vascular wall: a potential role in vascular stiffness and atherosclerosis. Clin Transl Sci. 2011 Jun;4(3):146-52. doi:10.1111/j.1752-8062.2011.00304.x. PubMed PMID: 21707943.

Keyel PA, Loultcheva L, Roth R, Salter RD, Watkins SC, Yokoyama WM, Heuser JE. Streptolysin O clearance through sequestration into blebs that bud passively from the plasma membrane. J Cell Sci. 2011 Jul 15;124(Pt 14):2414-23. Epub 2011 Jun 21. PubMed PMID: 21693578; PubMed Central PMCID: PMC3124372.

Manni ML, Tomai LP, Norris CA, Thomas LM, Kelley EE, Salter RD, Crapo JD, Chang LY, Watkins SC, Piganelli JD, Oury TD. Extracellular superoxide dismutase in macrophages augments bacterial killing by promoting phagocytosis. Am J Pathol. 2011 Jun;178(6):2752-9.



PubMed PMID: 21641397; PubMed Central PMCID: PMC3124355.

Wu J, Du Y, Watkins SC, Funderburgh JL, Wagner WR. The engineering of organized human corneal tissue through the spatial guidance of corneal stromal stem cells. Biomaterials. 2012 Feb;33(5):1343-52. Epub 2011 Nov 10. PubMed PMID: 22078813
.

Jun S, Ke D, Debiec K, Zhao G, Meng X, Ambrose Z, Gibson GA, Watkins SC, Zhang P. Direct Visualization of HIV-1 with Correlative Live-Cell Microscopy and Cryo-Electron Tomography. Structure. 2011 Nov 9;19(11):1573-81. PubMed PMID: 22078557; PubMed Central PMCID: PMC3217200.

Wu J, Du Y, Watkins SC, Funderburgh JL, Wagner WR. The engineering of organized human corneal tissue through the spatial guidance of corneal stromal stem cells. Biomaterials. 2012 Feb;33(5):1343-52. Epub 2011 Nov 10. PubMed PMID: 22078813; PubMed Central PMCID: PMC3254093.

Montecalvo A, Larregina AT, Shufesky WJ, Beer Stolz D, Sullivan ML, Karlsson JM, Baty CJ, Gibson GA, Erdos G, Wang Z, Milosevic J, Tkacheva OA, Divito SJ, Jordan R, Lyons-Weiler J, Watkins SC, Morelli AE. Mechanism of transfer of functional microRNAs between mouse dendritic cells via exosomes. Blood. 2011 Oct 26. [Epub ahead of print] PubMed PMID: 22031862.

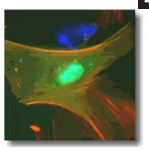
Wang X, Katayama A, Wang Y, Yu L, Favoino E, Sakakura K, Favole A, Tsuchikawa T, Silver S, Watkins SC, Kageshita T, Ferrone S. Functional Characterization of an scFv-Fc Antibody that Immunotherapeutically Targets the Common Cancer Cell Surface Proteoglycan CSPG4. Cancer Res. 2011 Dec 8. [Epub ahead of print] PubMed PMID: 22021902

Shvedova AA, Kapralov AA, Feng WH, Kisin ER, Murray AR, Mercer RR, St Croix CM, Lang MA, Watkins SC, Konduru NV, Allen BL, Conroy J, Kotchey GP, Mohamed BM, Meade AD, Volkov Y, Star A, Fadeel B, Kagan VE. Impaired clearance and enhanced pulmonary inflammatory/fibrotic response to carbon nanotubes in myeloperoxidase-deficient mice. PLoS One. 2012;7(3):e30923. Epub 2012 Mar 30.PubMed PMID: 22479306; PubMed Central PMCID: PMC3316527.

Grover A, Schmidt BF, Salter RD, Watkins SC, Waggoner AS, Bruchez MP.Genetically Encoded pH Sensor for Tracking Surface Proteins through Endocytosis. Angew Chem Int Ed Engl. 2012 Mar 29. doi: 10.1002/anie.201108107. [Epub ahead of print] PubMed PMID: 22461279.

Jha A, Watkins SC, Traub LM. The apoptotic engulfment protein Ced-6 participates in clathrin-mediated yolk uptake in Drosophila egg chambers. Mol Biol Cell. 2012 May;23(9):1742-64. Epub 2012 Mar 7. PubMed PMID: 22398720; PubMedCentral PMCID: PMC3338440.

Holleran JP, Glover ML, Peters KW, Bertrand CA, Watkins SC, Jarvik JW, Frizzell RA. Pharmacological Rescue of Mutant CFTR Detected Using a Novel Fluorescence Platform. Mol Med. 2012 Feb 29. doi: 10.2119/molmed.2012.00001.[Epub ahead of print] PubMed PMID: 22396015.



Livesey KM, Kang R, Vernon P, Buchser W, Loughran P, Watkins SC, Zhang L, Manfredi JJ, Zeh HJ 3rd, Li L, Lotze MT, Tang D. p53/HMGB1 Complexes Regulate Autophagy and Apoptosis. Cancer Res. 2012 Apr 15;72(8):1996-2005. Epub 2012 Feb 16. PubMed PMID: 22345153.

Richards TJ, Park C, Chen Y, Gibson KF, Peter Di Y, Pardo A, Watkins SC, Choi AM, Selman M, Pilewski J, Kaminski N, Zhang Y. Allele-specific transactivation of matrix metalloproteinase 7 by FOXA2 and correlation with plasma levels in idiopathic pulmonary fibrosis. Am J Physiol Lung Cell Mol Physiol. 2012 Apr;302(8):L746-54. Epub 2012 Jan 20. PubMed PMID: 22268124; PubMed CentralPMCID: PMC333157

Tilstra JS, Robinson AR, Wang J, Gregg SQ, Clauson CL, Reay DP, Nasto LA, StCroix CM, Usas A, Vo N, Huard J, Clemens PR, Stolz DB, Guttridge DC, Watkins SC, Garinis GA, Wang Y, Niedernhofer LJ, Robbins PD. NF-κB inhibition delays DNA damage-induced senescence and aging in mice. J Clin Invest. 2012 Jun 18. pii: 45785. doi: 10.1172/JCI45785. [Epub ahead of print] PubMed PMID: 22706308.

Khoo NK, Cantu-Medellin N, Devlin JE, St Croix CM, Watkins SC, Fleming AM, Champion HC, Mason RP, Freeman BA, Kelley EE. Obesity-induced tissue free radical generation: An in vivo immuno-spin trapping study. Free Radic Biol Med. 2012 Jun 1;52(11-12):2312-9. Epub 2012 Apr 21. PubMed PMID: 22564528.

Carruthers CA, Alfieri CM, Joyce EM, Watkins SC, Yutzey KE, Sacks MS. GENE EXPRESSION AND COLLAGEN FIBER MICROMECHANICAL INTERACTIONS OF THE SEMILUNAR HEART VALVE INTERSTITIAL CELL. Cell Mol Bioeng. 2012 Sep 1;5(3):254-265. Epub 2012 May 1. PubMed PMID: 23162672; PubMed Central PMCID: PMC3498494.

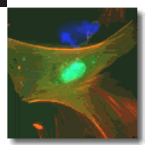
Medberry CJ, Crapo PM, Siu BF, Carruthers CA, Wolf MT, Nagarkar SP, Agrawal V,Jones KE, Kelly J, Johnson SA, Velankar SS, Watkins SC, Modo M, Badylak SF. Hydrogels derived from central nervous system extracellular matrix. Biomaterials.2013 Jan;34(4):1033-40. doi: 10.1016/j.biomaterials.2012.10.062. Epub 2012 Nov 16. PubMed PMID: 23158935.

Keyel PA, Heid ME, Watkins SC, Salter RD. Visualization of bacterial toxin induced responses using live cell fluorescence microscopy. J Vis Exp. 2012 Oct 1;(68). doi:pii: 4227. 10.3791/4227. PubMed PMID: 23052609

Qian W, Choi S, Gibson GA, Watkins SC, Bakkenist CJ, Van Houten B. Mitochondrial hyperfusion induced by loss of fission protein Drp1 causes ATM-dependent G2/M arrest and aneuploidy through DNA replication stress. J Cell Sci. 2012 Nov 23. [Epub ahead of print] PubMed PMID: 23015593.

Gao Y, Bertuccio CA, Balut CM, Watkins SC, Devor DC. Dynamin- and Rab5-dependent endocytosis of a Ca2+ -activated K+ channel, KCa2.3. PLoS One.2012;7(8):e44150. doi: 10.1371/journal.pone.0044150. Epub 2012 Aug 28. PubMed PMID: 22952906; PubMed Central PMCID: PMC3429460.

Watkins SC, Maniar S, Mosher M, Roman BL, Tsang M, St Croix CM. High resolution imaging of vascular function in zebrafish. PLoS One. 2012;7(8):e44018. doi: 10.1371/



journal.pone.0044018. Epub 2012 Aug 30. PubMed PMID: 22952858; PubMed Central PMCID: PMC3431338.

Choi S, Srivas R, Fu KY, Hood BL, Dost B, Gibson GA, Watkins SC, Van Houten B, Bandeira N, Conrads TP, Ideker T, Bakkenist CJ. Quantitative Proteomics Reveal ATM Kinase-dependent Exchange in DNA Damage Response Complexes. J Proteome Res. 2012 Oct 5;11(10):4983-91. doi: 10.1021/pr3005524. Epub 2012 Sep 18. PubMed PMID: 22909323; PubMed Central PMCID: PMC3495236.

Loughran PA, Stolz DB, Barrick SR, Wheeler DS, Friedman PA, Rachubinski RA,Watkins SC, Billiar TR. PEX7 and EBP50 target iNOS to the peroxisome in hepatocytes. Nitric Oxide. 2013 Mar 5. doi:pii: S1089-8603(13)00098-0. 10.1016/j.niox.2013.02.084. [Epub ahead of print] PubMed PMID: 23474170.

Fata B, Carruthers CA, Gibson G, Watkins SC, Gottlieb D, Mayer JE, Sacks MS. Regional structural and biomechanical alterations of the ovine main pulmonary artery during postnatal growth. J Biomech Eng. 2013 Feb;135(2):021022. doi: 10.1115/1.4023389. PubMed PMID: 23445067.

Tapias V, Greenamyre JT, Watkins SC. Automated imaging system for fast quantitation of neurons, cell morphology and neurite morphometry in vivo and in vitro. Neurobiol Dis. 2012 Dec 7. doi:pii: S0969-9961(12)00381-6. 10.1016/j.nbd.2012.11.018. [Epub ahead of print] PubMed PMID: 23220621; PubMed Central PMCID: PMC3604080.

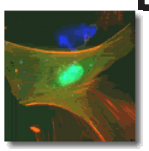
Wheeler SE, Shi H, Lin F, Dasari S, Bednash J, Thorne S, Watkins S, Joshi R, Thomas SM. Enhancement of head and neck squamous cell carcinoma proliferation, invasion, and metastasis by tumor-associated fibroblasts in preclinical models. Head Neck. 2013 Jun 1. doi: 10.1002/hed.23312. [Epub ahead of print] PubMed PMID:23728942.

Phillippi JA, Green BR, Eskay MA, Kotlarczyk MP, Hill MR, Robertson AM, Watkins SC, Vorp DA, Gleason TG. Mechanism of aortic medial matrix remodeling is distinct in patients with bicuspid aortic valve. J Thorac Cardiovasc Surg. 2013Jun 10. doi:pii: S0022-5223(13)00493-5. 10.1016/j.jtcvs.2013.04.028. [Epub ahead of print] PubMed PMID: 23764410.

Xu H, Franks T, Gibson G, Huber K, Rahm N, Strambio De Castillia C, Luban J, Aiken C, Watkins S, Sluis-Cremer N, Ambrose Z. Evidence for biphasic uncoating during HIV-1 infection from a novel imaging assay. Retrovirology. 2013 Jul 9;10(1):70. [Epub ahead of print] PubMed PMID: 23835323.

Holleran JP, Zeng J, Frizzell RA, Watkins SC. Regulated recycling of mutant CFTR is partially restored by pharmacological treatment. J Cell Sci. 2013 Jun 15;126 Pt 12:2692-703. doi: 10.1242/jcs.120196. Epub 2013 Apr 9. PubMed PMID:23572510; PubMed Central PMCID: PMC3687701.

Han J, Hou W, Lu C, Goldstein LA, Stolz DB, Watkins SC, Rabinowich H. Interaction Between Her2 and Beclin-1 Underlies a New Mechanism of Reciprocal Regulation. J Biol Chem. 2013 May 23. [Epub ahead of print] PubMed PMID: 23703612.



Kader M, Smith AP, Guiducci C, Wonderlich ER, Normolle D, Watkins SC, Barrat FJ, Barratt-Boyes SM. Blocking TLR7- and TLR9-mediated IFN-α Production by Plasmacytoid Dendritic Cells Does Not Diminish Immune Activation in Early SIV Infection. PLoS Pathog. 2013 Jul;9(7):e1003530. doi: 10.1371/journal.ppat.1003530. Epub 2013 Jul 25. PubMed PMID: 23935491; PubMed Central PMCID: PMC3723633.

Mailliard RB, Smith KN, Fecek RJ, Rappocciolo G, Nascimento EJ, Marques ET, Watkins SC, Mullins JI, Rinaldo CR. Selective Induction of CTL Helper Rather Than Killer Activity by Natural Epitope Variants Promotes Dendritic Cell-Mediated HIV-1 Dissemination. J Immunol. 2013 Sep 1;191(5):2570-80. doi: 10.4049/jimmunol.1300373. Epub 2013 Aug 2. PubMed PMID: 23913962.

Jun S, Zhao G, Ning J, Gibson GA, Watkins SC, Zhang P. Correlative microscopy for 3D structural analysis of dynamic interactions. J Vis Exp. 2013 Jun 24;(76). doi: 10.3791/50386. PubMed PMID: 23852318; PubMed Central PMCID: PMC3728906.

Watkins SC, St Croix CM. Building a live cell microscope: what you need and how to do it. Curr Protoc Cytom. 2013 Jul;Chapter 2:Unit 2.21. doi: 10.1002/0471142956.cy0221s65. PubMed PMID: 23835804.

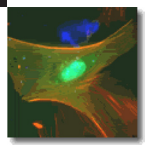
Deng M, Scott MJ, Loughran P, Gibson G, Sodhi C, Watkins S, Hackam D, BilliarTR. Lipopolysaccharide clearance, bacterial clearance, and systemic inflammatory responses are regulated by cell type-specific functions of TLR4 during sepsis. J Immunol. 2013 May 15;190(10):5152-60. doi: 10.4049/jimmunol.1300496. Epub 2013Apr 5. PubMed PMID: 23562812; PubMed Central PMCID: PMC3644895.

Bonacci G, Baker PR, Salvatore SR, Shores D, Khoo NK, Koenitzer JR, VitturiDA, Woodcock SR, Golin-Bisello F, Cole MP, Watkins S, St Croix C, Batthyany CI,Freeman BA, Schopfer FJ. Conjugated linoleic acid is a preferential substrate forfatty acid nitration. J Biol Chem. 2012 Dec 28;287(53):44071-82. doi:10.1074/jbc.M112.401356. Epub 2012 Nov 9. PubMed PMID: 23144452; PubMed CentralPMCID: PMC3531723.

Thomas SM, Sahu B, Rapireddy S, Bahal R, Wheeler SE, Procopio EM, Kim J,Joyce SC, Contrucci S, Wang Y, Chiosea SI, Lathrop KL, Watkins S, Grandis JR,Armitage BA, Ly DH. Antitumor effects of EGFR antisense guanidine-based peptidenucleic acids in cancer models. ACS Chem Biol. 2013 Feb 15;8(2):345-52. doi:10.1021/cb3003946. Epub 2012 Nov 9. PubMed PMID: 23113581; PubMed Central PMCID: PMC3684443.

Watkins SC, Maniar S, Mosher M, Roman BL, Tsang M, St Croix CM. High resolution imaging of vascular function in zebrafish. PLoS One. 2012;7(8):e44018. doi: 10.1371/journal.pone.0044018. Epub 2012 Aug 30. PubMed PMID: 22952858; PubMed Central PMCID: PMC3431338.

Choi S, Srivas R, Fu KY, Hood BL, Dost B, Gibson GA, Watkins SC, Van Houten B, Bandeira N, Conrads TP, Ideker T, Bakkenist CJ. Quantitative Proteomics Reveal ATM Kinase-dependent Exchange in DNA Damage Response Complexes. J Proteome Res. 2012 Oct 5;11(10):4983-91.



doi: 10.1021/pr3005524. Epub 2012 Sep 18. PubMed PMID:22909323; PubMed Central PMCID: PMC3495236.

Loughran PA, Stolz DB, Barrick SR, Wheeler DS, Friedman PA, Rachubinski RA,Watkins SC, Billiar TR. PEX7 and EBP50 target iNOS to the peroxisome in hepatocytes. Nitric Oxide. 2013 Mar 5. doi:pii: S1089-8603(13)00098-0.10.1016/j.niox.2013.02.084. [Epub ahead of print] PubMed PMID: 23474170.

Fata B, Carruthers CA, Gibson G, Watkins SC, Gottlieb D, Mayer JE, Sacks MS.Regional structural and biomechanical alterations of the ovine main pulmonaryartery during postnatal growth. J Biomech Eng. 2013 Feb;135(2):021022. doi:10.1115/1.4023389. PubMed PMID: 23445067.

Tapias V, Greenamyre JT, Watkins SC. Automated imaging system for fast quantitation of neurons, cell morphology and neurite morphometry in vivo and in vitro. Neurobiol Dis. 2012 Dec 7. doi:pii: S0969-9961(12)00381-6. 10.1016/j.nbd.2012.11.018. [Epub ahead of print] PubMed PMID: 23220621; PubMedCentral PMCID: PMC3604080.

Wheeler SE, Shi H, Lin F, Dasari S, Bednash J, Thorne S, Watkins S, Joshi R, Thomas SM. Enhancement of head and neck squamous cell carcinoma proliferation, invasion, and metastasis by tumor-associated fibroblasts in preclinical models. Head Neck. 2013 Jun 1. doi: 10.1002/hed.23312. [Epub ahead of print] PubMed PMID:23728942.

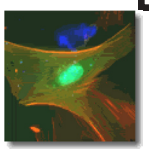
Phillippi JA, Green BR, Eskay MA, Kotlarczyk MP, Hill MR, Robertson AM, Watkins SC, Vorp DA, Gleason TG. Mechanism of aortic medial matrix remodeling is distinct in patients with bicuspid aortic valve. J Thorac Cardiovasc Surg. 2013Jun 10. doi:pii: S0022-5223(13)00493-5. 10.1016/j.jtcvs.2013.04.028. [Epub ahead of print] PubMed PMID: 23764410.

Xu H, Franks T, Gibson G, Huber K, Rahm N, Strambio De Castillia C, Luban J, Aiken C, Watkins S, Sluis-Cremer N, Ambrose Z. Evidence for biphasic uncoating during HIV-1 infection from a novel imaging assay. Retrovirology. 2013 Jul9;10(1):70. [Epub ahead of print] PubMed PMID: 23835323.

Holleran JP, Zeng J, Frizzell RA, Watkins SC. Regulated recycling of mutant CFTR is partially restored by pharmacological treatment. J Cell Sci. 2013 Jun 15;126 Pt 12:2692-703. doi: 10.1242/jcs.120196. Epub 2013 Apr 9. PubMed PMID:23572510; PubMed Central PMCID: PMC3687701.

Han J, Hou W, Lu C, Goldstein LA, Stolz DB, Watkins SC, Rabinowich H. Interaction Between Her2 and Beclin-1 Underlies a New Mechanism of Reciprocal Regulation. J Biol Chem. 2013 May 23. [Epub ahead of print] PubMed PMID:23703612.

Kader M, Smith AP, Guiducci C, Wonderlich ER, Normolle D, Watkins SC, Barrat FJ, Barratt-Boyes SM. Blocking TLR7- and TLR9-mediated IFN-α Production by Plasmacytoid Dendritic Cells Does Not Diminish Immune Activation in Early SIV Infection. PLoS Pathog. 2013 Jul;9(7):e1003530. doi: 10.1371/journal.ppat.1003530. Epub 2013 Jul 25. PubMed PMID: 23935491; PubMed Central PMCID: PMC3723633.



Mailliard RB, Smith KN, Fecek RJ, Rappocciolo G, Nascimento EJ, Marques ET, Watkins SC, Mullins JI, Rinaldo CR. Selective Induction of CTL Helper Rather Than Killer Activity by Natural Epitope Variants Promotes Dendritic Cell-Mediated HIV-1 Dissemination. J Immunol. 2013 Sep 1;191(5):2570-80. doi:10.4049/jimmunol.1300373. Epub 2013 Aug 2. PubMed PMID: 23913962.

Jun S, Zhao G, Ning J, Gibson GA, Watkins SC, Zhang P. Correlative microscopy for 3D structural analysis of dynamic interactions. J Vis Exp. 2013 Jun 24;(76). doi: 10.3791/50386. PubMed PMID: 23852318; PubMed Central PMCID: PMC3728906.

Heid ME, Keyel PA, Kamga C, Shiva S, Watkins SC, Salter RD. MitochondrialReactive Oxygen Species Induces NLRP3-Dependent Lysosomal Damage and InflammasomeActivation. J Immunol. 2013 Oct 2. [Epub ahead of print] PubMed PMID: 24089192.

Tsamis A, Phillippi JA, Koch RG, Pasta S, D'Amore A, Watkins SC, Wagner WR,Gleason TG, Vorp DA. Fiber micro-architecture in the longitudinal-radial andcircumferential-radial planes of ascending thoracic aortic aneurysm media. JBiomech. 2013 Sep 11. doi:pii: S0021-9290(13)00412-0.10.1016/j.jbiomech.2013.09.003. [Epub ahead of print] PubMed PMID: 24075403.

Hansen SD, Kwiatkowski AV, Ouyang CY, Liu H, Pokutta S, Watkins SC, VolkmannN, Hanein D, Weis WI, Mullins RD, Nelson WJ. Alpha-E-catenin Actin Binding DomainAlters Actin Filament Conformation and Regulates Binding of Nucleation andDisassembly Factors. Mol Biol Cell. 2013 Sep 25. [Epub ahead of print] PubMedPMID: 24068324.

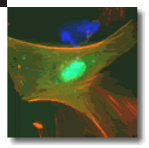
Messmer MN, Pasmowitz J, Kropp LE, Watkins SC, Binder RJ. Identification ofthe Cellular Sentinels for Native Immunogenic Heat Shock Proteins In Vivo. JImmunol. 2013 Oct 15;191(8):4456-4465. Epub 2013 Sep 18. PubMed PMID: 24048898.

Gamper AM, Rofougaran R, Watkins SC, Greenberger JS, Beumer JH, Bakkenist CJ. ATR kinase activation in G1 phase facilitates the repair of ionizingradiation-induced DNA damage. Nucleic Acids Res. 2013 Sep 14. [Epub ahead ofprint] PubMed PMID: 24038466.

Li HH, Li J, Wasserloos KJ, Wallace C, Sullivan MG, Bauer PM, Stolz DB, LeeJS, Watkins SC, St Croix CM, Pitt BR, Zhang LM. Caveolae-dependent and-independent uptake of albumin in cultured rodent pulmonary endothelial cells.PLoS One. 2013 Nov 27;8(11):e81903. doi: 10.1371/journal.pone.0081903. PubMedPMID: 24312378; PubMed Central PMCID: PMC3842245.

Hadi K, Walker LA, Guha D, Murali R, Watkins SC, Tarwater P, Srinivasan A,Ayyavoo V. Human immunodeficiency virus type 1 (HIV-1) Vpr polymorphismsassociated with progressor and non-progressor individuals alter Vpr associatedfunctions. J Gen Virol. 2013 Dec 4. doi: 10.1099/vir.0.059576-0. [Epub ahead of print] PubMed PMID: 24300552

Lin J, Countryman P, Buncher N, Kaur P, E L, Zhang Y, Gibson G, You C, Watkins SC, Piehler J, Opresko PL, Kad NM, Wang H. TRF1 and TRF2 use different mechanismsto find telomeric DNA but share a novel mechanism to search for protein partners at telomeres. Nucleic Acids Res. 2013



Nov 22. [Epub ahead of print] PubMed PMID: 24271387

Chu CT, Ji J, Dagda RK, Jiang JF, Tyurina YY, Kapralov AA, Tyurin VA, YanamalaN, Shrivastava IH, Mohammadyani D, Qiang Wang KZ, Zhu J, Klein-Seetharaman J,Balasubramanian K, Amoscato AA, Borisenko G, Huang Z, Gusdon AM, Cheikhi A, SteerEK, Wang R, Baty C, Watkins S, Bahar I, Bayır H, Kagan VE. Cardiolipinexternalization to the outer mitochondrial membrane acts as an elimination signalfor mitophagy in neuronal cells. Nat Cell Biol. 2013 Oct;15(10):1197-205. doi:10.1038/ncb2837. Epub 2013 Sep 15. PubMed PMID: 24036476; PubMed Central PMCID:PMC3806088

Vyas AR, Hahm ER, Arlotti JA, Watkins S, Stolz DB, Desai D, Amin S, Singh SV. Chemoprevention of prostate cancer by d,l-sulforaphane is augmented bypharmacological inhibition of autophagy. Cancer Res. 2013 Oct 1;73(19):5985-95.doi: 10.1158/0008-5472.CAN-13-0755. Epub 2013 Aug 6. PubMed PMID: 23921360;PubMed Central PMCID: PMC3790864.

Han J, Hou W, Goldstein LA, Stolz DB, Watkins SC, Rabinowich H. A complexbetween Atg7 and caspase-9: a novel mechanism of cross-regulation betweenautophagy and apoptosis. J Biol Chem. 2013 Dec 20. [Epub ahead of print] PubMedPMID: 24362031.

Kelley EE, Baust J, Bonacci G, Golin-Bisello F, Devlin JE, St Croix CM,Watkins SC, Gor S, Cantu-Medellin N, Weidert ER, Frisbee JC, Gladwin MT, ChampionHC, Freeman BA, Khoo NK. Fatty Acid Nitroalkenes Ameliorate Glucose Intoleranceand Pulmonary Hypertension in High Fat Diet-Induced Obesity. Cardiovasc Res. 2014Jan 2. [Epub ahead of print] PubMed PMID: 24385344.

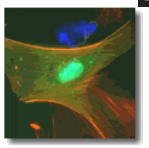
Fazzi F, Njah J, Di Giuseppe M, Winnica DE, Go K, Sala E, St Croix CM, Watkins SC, Tyurin VA, Phinney DG, Fattman CL, Leikauf GD, Kagan VE, Ortiz LA. TNFR1/PhoxInteraction and TNFR1 Mitochondrial Translocation Thwart Silica-Induced PulmonaryFibrosis. J Immunol. 2014 Apr 15;192(8):3837-46. doi: 10.4049/jimmunol.1103516.Epub 2014 Mar 12. PubMed PMID: 24623132; PubMed Central PMCID: PMC3977215.

Koch RG, Tsamis A, D'Amore A, Wagner WR, Watkins SC, Gleason TG, Vorp DA. A custom image-based analysis tool for quantifying elastin and collagenmicro-architecture in the wall of the human aorta from multi-photon microscopy. J Biomech. 2014 Mar 21;47(5):935-43. doi: 10.1016/j.jbiomech.2014.01.027. Epub 2014 Jan 20. PubMed PMID: 24524988

Klinkenberg D, Long KR, Shome K, Watkins SC, Aridor M. A cascade of ER exitsite assembly that is regulated by p125A and lipid signals. J Cell Sci. 2014 Apr 15;127(Pt 8):1765-78. doi: 10.1242/jcs.138784. Epub 2014 Feb 12. PubMed PMID: 24522181.

Muller L, Hong CS, Stolz DB, Watkins SC, Whiteside TL. Isolation of biologically-active exosomes from human plasma. J Immunol Methods. 2014 Jun 18.pii: S0022-1759(14)00190-2. doi: 10.1016/j.jim.2014.06.007. [Epub ahead of print] PubMed PMID: 24952243.

Kagan VE, Kapralov AA, St Croix CM, Watkins SC, Kisin ER, Kotchey GP, Balasubramanian K, Vlasova II, Yu J, Kim K, Seo W, Mallampalli RK, Star A, Shvedova AA. Lung macrophages "digest" carbon nanotubes using a superoxide/peroxynitrite oxidative pathway. ACS



Nano. 2014 Jun 24;8(6):5610-21. doi: 10.1021/nn406484b. Epub 2014 Jun 4. PubMed PMID: 24871084; PubMed Central PMCID: PMC4072413.

Long OS, Benson JA, Kwak JH, Luke CJ, Gosai SJ, O'Reilly LP, Wang Y, Li J, Vetica AC, Miedel MT, Stolz DB, Watkins SC, Züchner S, Perlmutter DH, Silverman GA, Pak SC. A C. elegans model of human α1-antitrypsin deficiency links components of the RNAi pathway to misfolded protein turnover. Hum Mol Genet. 2014 May 16. pii: ddu235. [Epub ahead of print] PubMed PMID: 24838286.

Luke CJ, Niehaus JZ, O'Reilly LP, Watkins SC. Non-microfluidic methods for imaging live C. elegans. Methods. 2014 May 15. pii: S1046-2023(14)00183-2. doi: 10.1016/j.ymeth.2014.05.002. [Epub ahead of print] PubMed PMID: 24836996.

Chakraborty S, Umasankar PK, Preston GM, Khandelwal P, Apodaca G, Watkins SC, Traub LM. A Phosphotyrosine Switch for Cargo Sequestration at Clathrin-coated Buds. J Biol Chem. 2014 Jun 20;289(25):17497-17514. Epub 2014 May 5. PubMed PMID: 24798335; PubMed Central PMCID: PMC4067187.

Ghodke H, Wang H, Hsieh CL, Woldemeskel S, Watkins SC, Rapić-Otrin V, VanHouten B. Single-molecule analysis reveals human UV-damaged DNA-binding protein (UV-DDB) dimerizes on DNA via multiple kinetic intermediates. Proc Natl Acad Sci U S A. 2014 May 6;111(18):E1862-71. doi: 10.1073/pnas.1323856111. Epub 2014 Apr 23. PubMed PMID: 24760829; PubMed Central PMCID: PMC402004

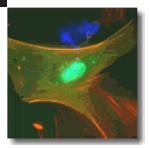
Gurski LA, Knowles LM, Basse PH, Maranchie JK, Watkins SC, Pilch J. Relocation of CLIC1 Promotes Tumor Cell Invasion and Colocalization of Fibrin. Mol Cancer Res. 2014 Sep 9. pii: molcanres.0249.2014. [Epub ahead of print] PubMed PMID:25205595.

Conti HR, Peterson AC, Brane L, Huppler AR, Hernández-Santos N, Whibley N, Garg AV, Simpson-Abelson MR, Gibson GA, Mamo AJ, Osborne LC, Bishu S, Ghilardi N, Siebenlist U, Watkins SC, Artis D, McGeachy MJ, Gaffen SL. Oral-resident natural Th17 cells and γδ T cells control opportunistic Candida albicans infections. J Exp Med. 2014 Sep 8. pii: jem.20130877. [Epub ahead of print] PubMed PMID: 25200028.

Krawiec JT, Weinbaum JS, St Croix CM, Phillippi JA, Watkins SC, Rubin JP, Vorp DA. A Cautionary Tale for Autologous Vascular Tissue Engineering: Impact of Human Demographics on the Ability of Adipose-Derived Mesenchymal Stem Cells to Recruit and Differentiate Into Smooth Muscle Cells. Tissue Eng Part A. 2014 Aug 13. [Epub ahead of print] PubMed PMID: 25119584.

Christine Wu, Ph.D.
Associate Professor

Dean, MD, Findlay, GD, Hoopmann, MR, Wu, CC, MacCoss, MJ, Swanson, WJ, Nachman, MW. (2011). Identification of ejaculated proteins in the house mouse (Mus domesticus) via isotopic labeling. BMC Genomics 12(1):306.



Willenborg, C, Jing, J, Wu, CC, Matern, H, Schaack, J, Burden, J, Prekeris, R. (2011). Interaction between FIP5 and SNX18 regulates epithelial lumen formation. J. Cell Biol. 195(1):71-86.

Schilling, B, Rardin, MJ, MacLean, BX, Zawadzka, AM, Frewen, BE, Cusack, MP, Sorensen, DJ, Bereman, MS, Jing, E, Wu, CC, Verdin, E, Kahn, CR, MacCoss, MJ, Gibson, BW. (2012). Platform-independent and label-free quantitation of proteomic data using MS1 extracted ion chromatograms in skyline: application to protein acetylation and phosphorylation. Mol. Cell. Proteomics 11(5):202-14.

Collins, LL, Simon, G, Matheson, J, Wu, CC, Miller, MC, Otani, T, Yu, X, Hayashi, S, Prekeris, R, Gould, GW. (2012). Rab11-FIP3 is a cell cycle-regulated phosphoprotein. BMC Cell Biol. 13:4.

Schiel, J, Simon, GC, Zaharris, C, Weisz, J, Castle, J, Wu, CC, Prekeris, R. (2012). FIP3-endosome dependent formation of the secondary ingression mediates ESCRT-III recruitment during cytokinesis. Nat. Cell Biol. (In press).

Nathan Yates, Ph.D.
Associate Professor

Sietsema KE, Meng F, Yates NA, Hendrickson RC, Liaw A, Song Q, Brass EP, Ulrich RG. Potential biomarkers of muscle injury after eccentric exercise. Biomarkers. 2010 May; 15(3):249-58.

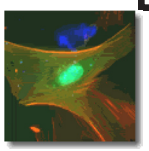
Paweletz CP, Wiener MC, Bondarenko AY, Yates NA, Song Q, Liaw A, Lee AY, Hunt BT, Henle ES, Meng F, Sleph HF, Holahan M, Sankaranarayanan S, Simon AJ, Settlage RE, Sachs JR, Shearman M, Sachs AB, Cook JJ, Hendrickson RC. Application of an end-to-end biomarker discovery platform to identify target engagement markers in cerebrospinal fluid by high resolution differential mass spectrometry. J Proteome Res. 2010 Mar 5; 9(3):1392-401.

Mazur MT, Cardasis HL, Spellman DS, Liaw A, Yates NA, Hendrickson RC. Quantitative analysis of intact apolipoproteins in human HDL by top-down differential mass spectrometry. Proc Natl Acad Sci USA. 2010 Apr 27; 107(17):7728-33.

Zhao X, Southwick K, Cardasis HL, Du Y, Lassman ME, Xie D, El-Sherbeini M, Geissler WM, Pryor KD, Verras A, Garcia-Calvo M, Shen DM, Yates NA, Pinto S, Hendrickson RC. Peptidomic profiling of human cerebrospinal fluid identifies YPRPIHPA as a novel substrate for prolylcarboxypeptidase. Proteomics. 2010 Aug; 10(15):2882-6.

Friedman DB, Andacht TM, Bunger MK, Chien AS, Hawke DH, Krijgsveld J, Lane WS, Lilley KS, MacCoss MJ, Moritz RL, Settlage RE, Sherman NE, Weintraub ST, Witkowska HE, Yates NA, Turck CW. The ABRF Proteomics Research Group studies: educational exercises for qualitative and quantitative proteomic analyses. Proteomics. 2011 Apr; 11(8):1371-81.

Falick AM, Lane WS, Lilley KS, MacCoss MJ, Phinney BS, Sherman NE, Weintraub ST, Witkowska HE, Yates NA. ABRF-PRG07: advanced quantitative proteomics study. J Biomol Tech. 2011 Apr; 22(1):21-6.



Chen F, Lam R, Shaywitz D, Hendrickson RC, Opiteck GJ, Wishengrad D, Liaw A, Song Q, Stewart AJ, Cummings CE, Beals C, Yarasheski KE, Reicin A, Ruddy M, Hu X, Yates NA, Menetski J, Herman GA. Evaluation of early biomarkers of muscle anabolic response to testosterone. J Cachex Sarcopenia Muscle. 2011 Mar; 2(1):45-56.

Lee AY, Yates NA, Ichetovkin M, Deyanova E, Southwick K, Fisher TS, Wang W, Loderstedt J, Walker N, Zhou H, Zhao X, Sparrow CP, Hubbard BK, Rader DJ, Sitlani A, Millar JS, Hendrickson RC. Measurement of Fractional Synthetic Rates of Multiple Protein Analytes by Triple Quadrupole Mass Spectrometry. Clin Chem. 2012 Mar;58(3):619-27

Conway JP, Johns DG, Wang SP, Walker ND, McAvoy TA, Zhou H, Zhao X, Previs SF, Roddy TP, Hubbard BK, Yates NA, Hendrickson RC. Measuring H218O Tracer Incorporation on a QQQ-MS Platform Provides a Rapid, Transferable Screening Tool for Relative Protein Synthesis. J Proteome Res. 2012 Mar 2;11(3):1591-7.

Weixun Wang, Nykia D. Walker, Li-Ji Zhu, Weizhen Wu, Lan Ge, David E. Gutstein, Nathan A. Yates, Ronald C. Hendrickson, Martin L. Ogletree, Michele Cleary, Gregory J. Opiteck, and Zhu Chen. Quantification of Circulating D-dimer by Peptide Immunoaffinity Enrichment and Tandem Mass Spectrometry. Analytical Chemistry 2012 84 (15), 6891-6898

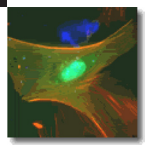
Wang W, Walker ND, Zhu LJ, Wu W, Ge L, Gutstein DE, Yates NA, Hendrickson RC, Ogletree ML, Cleary M, Opiteck GJ, Chen Z. Quantification of Circulating D-dimer by Peptide Immunoaffinity Enrichment and Tandem Mass Spectrometry. Anal Chem. 2012 84 (15), 6891-6898

Huang F, Zeng X, Kim W, Balasubramani M, Fortian A, Gygi SP, Yates NA, Sorkin A. Lysine 63-linked polyubiquitination is required for EGF receptor degradation. Proc Natl Acad Sci USA. 2013 Sep 24;110(39):15722-7.

Chappell DL, Lee AY, Castro-Perez J, Zhou H, Roddy TP, Lassman ME, Shankar SS, Yates NA, Wang W, Laterza OF. An ultrasensitive method for the quantitation of active and inactive GLP-1 in human plasma via Immunoaffinity LC-MS/MS. Bioanalysis. 2014 Jan:6(1):33-42

Antony ML, Lee J, Hahm ER, Kim SH, Marcus AI, Kumari V, Ji X, Yang Z, Vowell CL, Wipf P, Uechi GT, Yates NA, Romero G, Sarkar SN, Singh SV. Growth Arrest by the Antitumor Steroidal Lactone Withaferin A in Human Breast Cancer Cells is Associated with Down-regulation and Covalent Binding at Cysteine 303 of β-Tubulin. J Biol Chem. 2014 Jan 17;289(3):1852-65.

Wang W, Choi BK, Li W, Lao Z, Lee AY, Souza SC, Yates NA, Kowalski T, Pocai A, Cohen LH. Quantification of Intact and Truncated Stromal Cell-Derived Factor 1α in Circulation by Immunoaffinity Enrichment and Tandem Mass Spectrometry. J Am Soc Mass Spectrom. 2014 Feb 6 [Epub ahead of print].

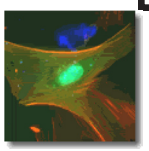


Executive Summary for the Cell Biology FY2015 Business Plan

The department has developed a diverse group of well funded investigators who contribute on many levels to the research and educational programs of the School of Medicine. During last four years significant changes in the Department took place with seven members of the primary faculty leaving the Department and five new members joining the faculty. This year one new primary faculty, Dr. M. Ford, joined the Department. Achievement of the balanced distribution of the junior and senior faculty and strong integration of all activities of the faculty remains the important goal of our FY2015 plan. To this end, we hope that a new junior faculty will join the Department in the FY2015. We plan to recruit a scientist who studies 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 2015 has been approved and is appended at the end of this analysis.



Strengths

Research

The Department of Cell Biology has a strong research program aimed at addressing fundamental questions of cell biology, including mechanisms controlling membrane trafficking, cell polarity, actin cytoskeleton, signal transduction, 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 general and cell biology journals such as the Molecular Biology of the Cell (Hansen, Kwiatkowski et al., 2014), Journal of Cell Science (Fortian & Sorkin, 2014; Klinkenberg et al., 2014; Nickel et al., 2014), and Journal of Biological Chemistry (Miller et al., 2014; Zhou et al., 2014).

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. Studies of the mechanisms of cell polarity, cell motility, and intracellular signaling have also been growing in the department. Our 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.

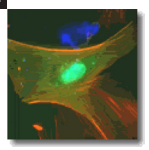
The majority of the Cell Biology faculty maintains active, funded research programs. We have been moderately successful in obtaining extramural research funding in the past cycle, as evidenced by the renewal of the P30 grant (Watkins), the competitive renewal of NIH and NSF grants (Frizzell, Murray, Leuba). Two senior faculty, Drs. Sorkin, and Watkins, have multiple NIH grants. Submission of new grant applications remains to be at a high rate which ensures relative fiscal stability of the Department.

The new recruit, Dr. Marijn Ford, joined the Department in December, 2013. His research is focused on elucidating the mechanisms of membrane fusion and fission.

Two Centers associated with the Department represent particular strengths of the Department and the School of medicine. The Center for Biologic Imaging (CBI) is one of the largest imaging facilities in the country and provides state-of-the-art equipment and indispensable expertise in all types of cellular imaging to the faculty of the

Department and the entire School of Medicine and University of Pittsburgh. In the last year, Drs. Watkins and Stolz were awarded multiple NIH shared instrumentation grants including new electron microscope, super-resolution system and freeze-fracture system which are essential to the continued growth of the CBI and departmental infrastructure. Dr. Yates, Director of the Biomedical Mass Spectrometry Center, SOM and UP, was awarded NIH SIG grant to purchase a new instrument to study metabolomics.

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 also



participated 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 various divisions of the Departments of Medicine and Pediatrics, as well as with the researchers at Carnegie Mellon University. Individual CB faculty hold major roles in organization of the annual "Local Traffic" and "Ubiquitin" symposiums, running the Membrane Trafficking journal club and participate 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.

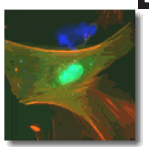
Graduate Curriculum: We now have 4 students in the graduate Ph.D. program in Cell Biology and Molecular Physiology. One student graduated in 2014, taking position as a postdoctoral fellow. In addition, CB faculty participate in other graduate programs under umbrella of the Medical School Interdisciplinary Biomedical Graduate Program, as well as in the Departments of Bioengineering, Biological Sciences, Neuroscience among others.

Administration: 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, recruitment of new faculty, as well as with changes in the administrative staff. The fact that all these tasks were 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; 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 in 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.



Opportunities

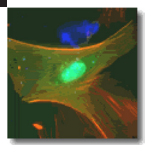
The vision of the chair and the leadership of the School, is to focus our research program towards basic cell biology and build a premier Department of Cell Biology. The key to accomplishing this task is the recruitment of new dynamic and creative faculty. We plan to continue recruiting faculty whose research programs focus on fundamental questions of cell biology, and in particular, who is using state-of-the-art mass-spectrometry methodologies. The importance of the successful recruitment of a strong faculty to shape the future of the department, while achieving a healthy balance of junior and senior faculty members, is difficult to overemphasize.

Cohesiveness of the faculty research expertise in the Department creates exceptional opportunities for collaborative research, which should open doors to building new program projects and centers. The Department is now in the position to lead the assembly of new interdisciplinary research programs that would be competitive in obtaining the extramural funding.

Threats

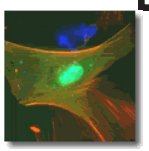
The steady decrease in federal and private funding opportunities will continue to be the most significant threat during next several years. Yet, in order for the Department to become one of the elite cell biology departments, total funding of the Department must increase 2-fold above the current level.

Another difficult challenge we face is to strengthen 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.



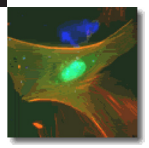
Cell Biology FY2015 Fiscal Issues

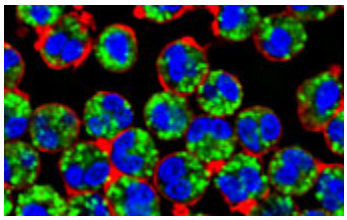
The main budgetary issue that faced the Department in the FY15 budget was maintaining the extramural funding of the faculty at the level necessary to support their research program and as required by the SOM Policies. Our goal is to maintain the current funded level; however, all efforts must be made to obtain additional funding. In light of the continuing drought of NIH funding, this is expected to be a major challenge. Main efforts will be devoted to ensure that the departmental infrastructure continues to improve.



University of Pittsburgh School of Medicine
University of Pittsburgh Physicians
Department of Cell Biology
Schedule of Revenue and Expenses Fiscal Year 2015 Budget

	University	UPP and Other	Total Budget FY 2015
Revenue			
Patient Care	$ -	$ -	$ -
Grant:			
Directs	3,512,958	-	3,512,958
Indirects	1,190,229	-	1,190,229
Hospital Contract	-	-	-
School of Medicine	3,230,578		3,230,578
VAMC		-	-
Other	371,192	-	371,192
Total Revenue	$ 8,304,957	$ -	$ 8,304,957
Expenses			
Salaries and Fringe Benefits:			
Faculty	$ 2,518,711	$ -	$ 2,518,711
Non-Faculty	2,284,889	-	2,284,889
Malpractice Insurance		-	-
Space Rental	85,315	-	85,315
UPP Overhead		-	-
University Overhead	2,242,690		2,242,690
Other Operating Expenses	1,173,352	-	1,173,352
Total Operating Expenses	$ 8,304,957	$ -	$ 8,304,957
Excess Revenue over Expenses	$ -	$ -	$ -
Capital Equipment/Improvements	$ -	$ -	$ -
Fund Balances			
University Restricted Accounts as of 6/30/14	$ 5,159,525	$ -	$ 5,159,525
University Endowments as of 6/30/14	351,747		351,747
UPP Fund Balance as of 6/30/14		-	-
UPMC Endowments as of 6/30/14		-	-
UPMC SPF Accounts as of 6/30/14		-	-
Total Fund Balances	$ 5,511,272	$ -	$ 5,511,272





Thank you for your kind attention.