

**2009-2010**  
**Summary of Scholarly Activities**  
**Department of Pharmacology**

**I. PUBLISHED JOURNAL ARTICLES, BOOK CHAPTERS, AND PATENTS**

Abe K, Toba M, Alzoubi A, Ito M, Fagan KA, Cool CD, Voelkel NF, McMurtry IF, Oka M. Formation of plexiform lesions in experimental severe pulmonary arterial hypertension. *Circulation* 2010 Jun 29;121(25):2747-54.

Al-Mehdi AB. Pulmonary endothelium and malignancies. In: Voelkel NF, Rounds S, editors. *The pulmonary endothelium: function in health and disease*. New Jersey: John Wiley & Sons; 2009. p. 485-90.

Alvarez DF, Helm K, DeGregori J, Roederer M, Majka S. Publishing flow cytometry data (Review). *Am J Physiol Lung Cell Mol Physiol* 2010 Feb;298(2):L127-30.

Bailey SW, Ayling JE. The extremely slow and variable activity of dihydrofolate reductase in human liver and its implications for high folic acid intake. *Proc Nat Acad Sci USA* 2009;106(36):15424-9.

Cioffi DL, Barry C, Stevens T. Store-operated calcium entry channels in pulmonary endothelium: the emerging story of TRPCs and Orail. *Adv Exp Med Biol* 2010;661:137-54.

Cioffi DL, Wu S, Stevens T. Lung endothelial cell phenotypes. Insights derived from the systematic study of calcium channels. In: Voelkel NF, Rounds S, editors. *The pulmonary endothelium: function in health and disease*. New Jersey: Wiley-Blackwell Publishing; 2009. p. 129-42.

Gillespie MN, Pastukh V, Ruchko MV. Oxidative DNA modifications in hypoxic signaling. *Ann N Y Acad Sci* 2009 Oct; 1177:140-50.

Gillespie MN, Olson JW. Polyamine regulatory pathways as pharmacologic targets in pulmonary arterial hypertension. *Adv Exp Med Biol* 2010;661:375-89.

Gupte RS, Rawat DK, Chettimada S, Cioffi DL, Wolin MS, Gerthoffer WT, McMurtry IF, Gupte SA. Activation of glucose-6-phosphate dehydrogenase promotes acute hypoxic pulmonary artery contraction. *J Biol Chem* 2010 Jun 18;285(25):19561-71.

Hill KL, Obrtlíkova P, Alvarez DF, King JA, Keirstead SA, Allred JR, Kaufman DS. Human embryonic stem cell-derived vascular progenitor cells capable of endothelial and smooth muscle cell function. *Exp Hematol* 2010 Mar;38(3):246-57.

Jong CJ, Ito T, Mozaffari M, Azuma J, Schaffer S. Effect of beta-alanine treatment on mitochondrial taurine level and 5-taurinomethyluridine content. *J Biomed Sci* 2010 Aug 24;17 (Suppl 1):S25. Available from: <http://www.jbiomedsci.com/content/171/S1/S25>

Li Y, Liu S, Lu F, Zhang T, Chen H, Wu S, Zhuang H. A role of functional T-type  $Ca^{2+}$  channel in hepatocellular carcinoma cell proliferation. *Oncol Rep* 2009 Nov;22(5):1229-35.

Lowe K, Alvarez DF, King JA, Stevens T. Perivascular fluid cuffs decrease lung compliance by increasing tissue resistance. *Crit Care Med* 2010 Jun;38(6):1458-66.

McMurtry IF, Abe K, Ota H, Fagan KA, Oka M. Rho kinase-mediated vasoconstriction in pulmonary hypertension. *Adv Exp Med Biol* 2010;661:299-308.

Mozaffari MS, Abdelsayed R, Patel C, Wimborne H, Liu JY, Schaffer SW. Differential effects of taurine treatment and taurine deficiency on the outcome of renal ischemia reperfusion injury. *J Biomed Sci* 2010 Aug 24;17(Suppl 1):S32. Available from: <http://www.jbiomedsci.com/content/17/S1/S32>

Mozaffari MS, Liu JY, Schaffer SW. Effect of pressure overload on cardioprotection via PI3K-Akt: comparison of postconditioning, insulin, and pressure unloading. *Am J Hypertens* 2010 Jun; 23(6):668-74.

Ochoa CD, Wu S, Stevens T. New developments in lung endothelial heterogeneity: von Willebrand factor, P-selectin, and the Weibel-Palade body. *Semin Thromb Hemost* 2010 Apr;36(3):301-8.

Pastukh V, Chen H, Wu S, Jong CJ, Alexeyev M, Schaffer SW. Effect of hypernatremia on injury caused by energy deficiency: role of T-type  $Ca^{2+}$  channel. *Am J Physiol Cell Physiol* 2010 Aug;299(2):C-289-97.

Ramsey AJ, Russell LC, Chinkers M. C-terminal sequences of hsp70 and hsp90 as non-specific anchors for TPR proteins. *Biochem J* 2009 Oct 12;423(3):411-9.

Schaffer SW, Jong CJ, Ramila KC, Azuma J. Physiological roles of taurine in heart and muscle. *J Biomed Sci* 2010 Aug 12;17(Suppl 1):S2. Available from: <http://www.jbiomedsci.com/content/17/S1/S2>

Stenmark KR, Meyrick B, Galie N, Mooi WJ, McMurtry IF. Animal models of pulmonary arterial hypertension. The hope for etiologic discovery and pharmacologic cure? *Am J Physiol Lung Cell Mol Physiol* 2009 Dec;297(6):L1013-32.

Vayttaden SJ, Friedman J, Tran TM, Rich TC, Dessauer CW, Clark RB. Quantitative modeling of GRK-mediated  $\beta$ 2AR regulation. *PLoS Comput Biol* [Internet] 2010 Jan 22;6(1):e1000647. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2798957/pdf/pcbi.1000647.pdf>

Wu S, Jian MY, Xu YC, Zhou C, Al-Mehdi AB, Liedtke W, Shin HS, Townsley MI.  $Ca^{2+}$  entry via  $\alpha_{1G}$  and TRPV4 channels differentially regulates surface expression of P-selectin and barrier integrity in pulmonary capillary endothelium. *Am J Physiol Lung Cell Mol Physiol* 2009 Oct;297(4):L650-7.

Zhou C, Chen H, King JA, Sellak H, Kuebler WM, Yin J, Townsley MI, Shin HS, Wu S.  $\alpha_{1G}$  T-type calcium channel selectively regulates P-selectin surface expression in pulmonary capillary endothelium. *Am J Physiol Lung Cell Mol Physiol* 2010 Jul 16;299(1):L86-97.

## II. PUBLISHED ABSTRACTS

Abe K, Toba M, Alzoubi A, Ito M, Fagan KA, Cool CD, Voelkel NF, McMurtry IF, Oka M. Formation of plexiform lesions in experimental severe pulmonary arterial hypertension. *Am J Respir Crit Care Med* 2010;181:A6336. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A6336](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A6336)

Al-Mehdi AB, Patel M, Reed D. Electron transport chain-dependent oxygen consumption in metastatic breast cancer cells. AACR Meeting 2010 Apr 17-21; Washington, DC. Abstract no. 75.

Alzoubi A, Toba M, Abe K, Fagan KA, McMurtry IF, Oka M. Dehydroepiandrosterone attenuates established severe pulmonary arterial hypertension in rats. *Am J Respir Crit Care Med* 2010;181:A6302. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A6302](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A6302)

Bailey SW, Gurven M, Kaplan H, Alverson PB, Ayling JE. A surprising level of unmetabolized folic acid in serum from the Tsimane Amerindians of Bolivia. *FASEB J* 2010 Apr;24:228.8.

Bardwell GC, Clark DW, Pastukh V, Gillespie MN. Regulation by hypoxia of histone acetylation at the hypoxic response element of the VEGF promoter in pulmonary artery endothelial cells (PAECS): conspicuous involvement of the transcriptional co-activator and DNA base excision repair enzyme, Ref-1/APE1. *Am J Respir Crit Care Med* 2010;181:A3939. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3939](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3939)

Barry CF, Wu S, Cioffi DL, Stevens T. Disruption of the constitutive spectrin-actin induces inter-endothelial cell gap formation. Am J Respir Crit Care Med 2010;181:A3428. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3428](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3428)

Bauer NN, Rai J, Chen H, Harris L, Shevde L, King J. Breast cancer microparticles promote formation of a microenvironment favorable for lung metastasis. FASEB J 2010;24:592.6.

Bauer N, Smith CA. Inhibition of T-type calcium channels in pulmonary microvascular endothelium causes increased release of hypoxia-induced microparticles. Am J Respir Crit Care Med 2010 May 17;181:A3433. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3433](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3433)

Bauer N, Smith CA. Pulmonary microvascular endothelial microparticle release is governed by Rho kinase signaling and T-type calcium channel activation. Am J Respir Crit Care Med 2010 May 17;181:A3439. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3439](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3439)

Chen H, Cioffi DL, Alexeyev MF, Wu S, Stevens T. Contribution of Orail to a Ca<sup>2+</sup> selective store-operated current,  $I_{soc}$ , in pulmonary artery endothelial cells. Am J Respir Crit Care Med 2010;181:A3424. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3424](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3424)

Chettimada S, Oka M, McMurtry IF, Gupte SA. Role of glucose-6-phosphate dehydrogenase (G6PD) in chronic hypoxia-induced pulmonary hypertension. FASEB J 2010;24:1023.2.

Chouteau J, Obiako B, Gorodnya O, Wilson GL, Gillespie MN. Mitochondrial DNA integrity may govern endothelial barrier properties in perfused rat lungs. Am J Resp Crit Care Med, 2010 May 15;181:A1039. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A1039](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A1039)

Clark DW, Bardwell GC, Pastukh V, Ruchko MV, Gorodnya O, Gillespie MN. Controlled oxidative DNA damage and repair at the hypoxic response element of the VEGF promoter in hypoxic pulmonary artery endothelial cells. Am J Resp Crit Care Med 2010 May 17; 181:A3941. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3941](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3941)

Clark DW, Phang T, Edwards M, Geraci M, Gillespie MN. Transcriptional regulation by G-quadruplex sequences in hypoxic pulmonary artery endothelia cells (PAECs). *Am J Resp Crit Care Med*, 2010 May 17; 181:A3940. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3940](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3940)

Fagan KA, Gairhe S, Abe K, Oka M, McMurtry IF. Increased fibronectin in an animal model of severe pulmonary arterial hypertension. *Am J Respir Crit Care Med* 210;181:A6289. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A6289](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A6289)

Fazili Z, Bailey SW, Paladugula N, Ayling JE, Pfeiffer CM. Interconversions of plasma folate species in response to dosing with oral folic acid and 5-methyltetrahydrofolate: an LC-MS/MS pilot study. *FASEB J* 2010 Apr;24:915.1.

Feinstein WP, Rich TC. The subcellular localization of adenylyl cyclase and phosphodiesterase is a critical factor in determining responses to cAMP signals. *Am J Respri Crit Care Med* 2010 May 17;181:A3438. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3438](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3438)

Gairhe S, Gebb SA, McMurtry IF. TGF- $\beta$  mediates myoendothelial gap junctional signaling-dependent differentiation of pulmonary arterial smooth muscle cells. *Am J Respir Crit Care Med* 2010;181:A1170. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A1170](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A1170)

Gairhe S, McMurtry IF. Hypoxia disrupts myoendothelial gap junctional signaling and causes dedifferentiation of pulmonary arterial smooth muscle cells co-cultured with pulmonary arterial endothelial cells. *Am J Respir Crit Care Med* 2010;181:A3947. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3947](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3947)

Jong CJ, Pastukh V, Ito T, Azuma J, Schaffer S. Mitochondrial dysfunction in taurine deficient cardiomyocytes. Taurine – A Wonderful Molecule, Proceedings of the 17<sup>th</sup> International Taurine Conference 2009 Dec 14-19; Fort Lauderdale, FL.

Leavesley S, Wang X, Rich TC. Assessing FRET response of fluorescent proteins in varying cellular microenvironments and equipment configurations. XXV Congress of the International Society for Advancement of Cytometry 2010 May 8-12. Seattle, WA.

MacCooey A, Sweeney MR, Boilson A, Scott JM, Staines A, Kelleher C, Daly LL, Bailey SW, Alverson PB, Ayling JE, Parle-McDermott A. No correlation between unmetabolised folic acid levels and folate gene polymorphisms in an Irish population. Irish Society of Human Genetics, Belfast, Ireland. *Ulster Med J* 2010 Sep;80.

Ochoa CD, Alexeyev MF, Stevens T. Conditional expression of an exotoxin gene in lung endothelium. *Am J Respir Crit Care Med* 2010 May;181:A3442. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3442](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3442)

Ochoa CD, Sayner S, Alvarez DE, Stevens T. Mechanisms of perivascular edema in *Pseudomonas aeruginosa* pneumonia. *Am J Respir Crit Care Med* 2010 May 17;181:A2664. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A2664](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A2664)

Ochoa CD, Stevens T, Balczon R. Freezing temperatures do not disassemble endothelial cell microtubules. *Am J Respir Crit Care Med* 2010 May;181:A3413. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3413](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3413)

Parra-Bonilla G, Alexeyev MF, Stevens T. Essential role of lactate dehydrogenase-A in pulmonary microvascular endothelial cell proliferation. *Am J Respir Crit Care Med* 2010 May;181:A3447. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3447](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3447)

Pastukh V, Reed D, Clark DW, Al-Mehdi A, Gillespie MN. Nuclear oxidant stress in estrogen-stimulated pulmonary artery endothelial cells. *Am J Resp Crit Care Med* 2010 May 17;181:A3948. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3948](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3948)

Rawat DK, Gupte RS, Chettimada S, McMurtry IF, Gupte SA. Activation of glucose-6-phosphate dehydrogenase promotes acute hypoxic pulmonary artery contraction. *FASEB* 2010; 24:795.6.

Reed D, Gillespie MN, Al-Mehdi A. Heterogeneity of nuclear oxidative response to hypoxia in rat pulmonary artery endothelial cells. *Am J Resp Crit Care Med* 2010 May 17;181:A3943. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3943](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3943)

Robson M, Stevens TC, Ochoa CD, Barry CF, Sayner S, Stevens T, Wu S. *Pseudomonas aeruginosa* increases cytosolic calcium in pulmonary microvascular endothelial cells, putatively important for p-selective upregulation and neutrophil recruitment into the alveolus. *Am J Respir Crit Care Med* 2010;181:A2666. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A2666](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A2666)

Rothrock C, Troyanovsky B, Alvarez D. Expression of NAP1L1 determines the reparative capacity of endothelial progenitor cells following exposure to cigarette smoke. *Am J Respir Crit Care Med* 2010 May 17;181:A3450. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3450](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3450)

Ruchko MV, Gorodnya O, Pastukh VM. Hypoxia-induced oxidative DNA modifications in the D-loop region may be linked to mitochondrial transcriptional in human pulmonary artery endothelial cells. *Am J Resp Crit Care Med*. 2010 May; 181;2010:A3942. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3942](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3942)

Ruchko MV, Gorodnya O, Pastukh VM. Hypoxia-induced oxidative DNA modifications in the D-loop region may be linked to mitochondrial transcriptional in human pulmonary artery endothelial cells. *Am J Resp Crit Care Med*. 2010 May; 181;2010:A3942. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3942](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3942)

Sayner S, Balczon R, Frank D, Cooper D, Stevens T. Targets of subplasma membrane versus cytosolic adenylyl cyclase activity demonstrate the bidirectional nature of the cAMP barricade that maintains pulmonary endothelial cell barrier integrity. *Am J Respir Crit Care Med* 2010 May;181:A1037. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A1037](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A1037)

Stevens TC, Robson M, Ochoa CD, Barry CF, Sayner S, Wu S, Stevens T. The *pseudomonas aeruginosa* exotoxin y induces pulmonary microvascular endothelial cell gaps independent of an increase in cytosolic calcium. *Am J Respir Crit Care Med* 2010;181:A2665. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A2665](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A2665)

### III. PUBLISHED BOOKS

### IV. INVITED PRESENTATIONS

Alvarez DF. Invited speaker. Mechanisms of acute injury: role of the endothelium. American Thoracic Society; 2010 May 16; New Orleans, LA.

Alvarez DF. Invited speaker. On the hunt for endothelial progenitor cells. University of Pennsylvania; 2010 May 21; Philadelphia, PA.

Alvarez DF. Invited speaker. Point counterpoint: an update in endothelial barrier function. Experimental Biology International Meeting; 2010 May 27; Anaheim, CA.

Cioffi EA. Invited speaker. Glycomorphology of the pulmonary vasculature: endothelial cell glycocalyx and endothelial barrier function. American Thoracic Society International Meeting; 2010 May 16; New Orleans, LA.

Gillespie MN. Invited speaker. Bending and breaking the DNA code: implications for transcriptional regulation. Davis Cardiovascular Research Institute; 2010 Jun 23; Columbus, OH.

McMurtry IF. Invited speaker. S1P4 receptor mediates S1P-induced vasoconstriction in normotensive and hypertensive rat lungs. Victoria Johnson Center for Pulmonary Obstructive Disease Research, Virginia Commonwealth University; 2009 Oct 12; Richmond, VA.

McMurtry IF. Invited speaker. Elaboration on a rat model of severe PAH. NHLBI-ORDR Workshop on Strategic Planning Sessions in Pulmonary Vascular Disease; 2010 Mar 9; Bethesda, MD.

Rich T. Invited speaker. The contributions of localized phosphodiesterase activity in compartmentalizing cyclic nucleotide signals. University of Texas Health Sciences Center Department of Integrative Biology and Pharmacology; 2009 Dec 14; Houston, TX.

Rich T. Invited speaker. Phosphodiesterase-mediated regulation of pulmonary endothelial barrier integrity. Gordon Research Conference on Cyclic Nucleotide Phosphodiesterases; 2010 Jun 16; Waterville Valley, NH.

Ruchko MV. Invited speaker. Hypoxia-induced oxidative modifications in the D-loop region of the mitochondrial (Mt) genome may be linked to mtDNA replication and transcription in human pulmonary artery endothelial cells. American Thoracic Society International Conference; 2010 May 17; New Orleans, LA.

Schaffer SW. Invited speaker. Mitochondrial dysfunction in taurine deficient cardiomyocytes. 17<sup>th</sup> Annual International Taurine Meeting; 2009 Dec 15; Miami, FL.

Schaffer SW. Invited speaker. Role of taurine in cardiac and skeletal muscle: an overview. 17<sup>th</sup> Annual International Taurine Meeting; 2009 Dec 15; Miami, FL.

Schaffer SW. Invited speaker. Role of angiotensin II in pressure-mediated ischemia-reperfusion injury; 2010 Apr 17; Amman, Jordan.

Schaffer SW. Invited speaker. Cardiovascular pharmacology. Balamand University; 2010 Apr 14; Beirut, Lebanon.

Schaffer SW. Invited speaker. Role of angiotensin II and PI3-kinase/Akt signaling in pressure-mediated ischemia-reperfusion injury. Balamand University Medical School; 2010 Apr 15; Beirut, Lebanon.

Stevens T. Invited speaker. Strategic plan for lung vascular research. Blood Transfusions in Clinical Medicine, NHLBI-ORD Workshop; 2010 Feb 2; Bethesda, MD.

Stevens T. Invited speaker. Lung endothelial heterogeneity. lesson learned through the systematic study of calcium channels. Harvard Medical School, Center for Vascular Biology, Beth Israel Deaconess Medical Center; 2010 Feb 10; Boston, MA.



Stevens T. Invited speaker. Lung endothelial heterogeneity: lessons learned through the systematic study of calcium channels. Emory Medical School, Center for Endothelial Cell Biology; 2010 Mar 2; Atlanta, GA.

Stevens T. Invited speaker. Lung endothelial heterogeneity: lessons learned through the systematic study of calcium channels. Medical College of Georgia, Center for Vascular Biology; 2010 Apr 19; Augusta, GA.

Stevens T. Invited speaker. Point counter-point: soluble adenylyl cyclases disrupt the endothelial cell barrier. Experimental Biology; 2010 Apr 25; Anaheim, CA.

## V. NATIONAL PROFESSIONAL RECOGNITION

Dr. Abu-Bakr Al-Mehdi served as a reviewer, Science Content Survey, 5<sup>th</sup> Comprehensive Review of the MCAT Exam (MR5).

Dr. Diego F. Alvarez is the website coordinator, Program and Planning Committee member, of the Pulmonary Circulation Assembly – American Thoracic Society; Program Committee member and Nominating Committee Chair of the Respiratory Section – American Physiological Society; member of The International Society for Stem Cell Research and Federation of American Societies for Experimental Biology; Abstract reviewer for the American Heart Association International Conference 2010 and the American Thoracic Society International Conference 2010; American Thoracic Society Mini Symposium Chair; Experimental Biology International Meeting – Symposium – Chair; peer reviewer for manuscripts submitted to the *American Journal of Physiology – Lung Cellular and Molecular Physiology*, *Microvascular Research*, *Translational Research*, *American Journal of Respiratory Cell and Molecular Biology*, and *American Journal of Respiratory and Critical Care Medicine*. He was appointed to the editorial board, *American Journal of Physiology-Lung Cellular and Molecular Physiology*.

Dr. June E. Ayling served as reviewer for the *American Journal of Clinical Nutrition and Photochemistry and Photobiology*.

Dr. Natalie Bauer served as an invited reviewer for manuscripts submitted to the *American Journal of Physiology, Lung, Cell and Molecular Physiology* and *Comprehensive Physiology*; new study section member of the American Lung Association. She received special recognition by Sigma Xi, the Scientific Research Society.

Dr. Michael Chinkers served as a reviewer, *Journal of Molecular and Cellular Cardiology*.

Dr. Eugene A. Cioffi served as a reviewer and co-editor, *Current Topics in Medicinal Chemistry* (Journal); reviewer, *Journal of Physical Chemistry*; reviewer, *Journal of Organic Chemistry*; *Synthesis* (Journal), *Synthetic Communications* (Journal), *Bioorganic and Medicinal Chemistry* (Journal), *Carbohydrate Research Journal*, *Journal of Labeled Compounds and Radiopharmaceuticals and Environmental Science and Technology* (Journal); grant reviewer, National Science Foundation (NSF) and National Institute of Health (NIH).

Dr. Mark N. Gillespie is a co-inventor (with Dr. Glenn Wilson) on mitochondrially targeted fusion protein constructs for use in treating oxidant-mediated diseases. He served on the Editorial Board, *American Journal of Physiology, Lung Cell and Molecular Physiology*; Editorial Board, *American Journal of Respiratory Cell and Molecular Biology*; Program, Leadership, and Long Range Planning Committees, American Thoracic Society; Ad hoc member, SIR/STTR study section and NIH study sections (1), Special Emphasis Panel (2); American Lung Association Research Peer Review panel. Dr. Gillespie also served as a manuscript reviewer for all major journals relevant to his field of research; Chairman, Pulmonary Circulation Assembly, American Thoracic Society.

Dr. Ivan F. McMurtry was a member of Biology Reports' Faculty of 1000 for the Cardiovascular and Respiratory Pharmacology Section; Member at large of the leadership committee of AHA Council on Cardiopulmonary, Perioperative, and Critical Care; Editor (along with M. Gillespie, T. Stevens, and W. Wagner, Jr.) of American Physiology Society's new online journal *Comprehensive Physiology: Topic on Pulmonary Circulation and non-Respiratory Functions*; International Associate Editor of *Circulation Journal*. He reviewed manuscripts for *American Journal of Physiology Lung Cellular Molecular Physiology* (Star Reviewer), *American Journal of Physiology Heart & Circulation*, *American Journal of Respiratory Critical Care Medicine*, *American Journal of Respiratory Cellular, Molecular Biology*, *British Journal of Pharmacology*, *Cardiovascular Research*, *Chest*, *Circulation Journal*, *CRC Critical Reviews in Therapeutic Drug Carrier Systems*, *Journal of Applied Physiology*, *Journal of Comparative Physiology*, *Nature Medicine*, and *Nature Rev Cardiology*. He also participated in review of NIH PPG grant application from S Black et al., Medical College of Georgia (2009 Oct 9).

Dr. Jack W. Olson served on the Executive Committee – Cardiovascular Medical Research and Education Fund (CMREF); ATS Meeting – Discussion Facilitator for Thematic Poster Session.

Dr. Thomas Rich is a member, AHA Electrophysiology 1 Study Section; Ad hoc reviewer for European Research Council, *American Journal of Physiology – Lung, Biophysical Journal and Chemistry and Biology*.

Dr. Stephen W. Schaffer served as a member of NIH Study Section on Mitochondria, Nov 5-6, 2009; Associate Editor, *Molecular Cell Biochemistry*; Section Editor, *Amino Acids*; Secretary, International Academy of Cardiovascular Sciences, American Section; and Editor, Special Edition, *Journal of Biomedical Sciences*.

Dr. Troy Stevens served as Associate Editor, *American Journal of Physiology – Lung*; Editor, *Experimental Biology Medicine*; SEP Reviewer, PO1 Application for University of Illinois; Long Range Planning Committee Chair, Pulmonary Circulation Assembly, ATS; External Advisor, Medical College of Georgia PPG Application, P.I. Black.

Dr. Wiltz W. Wagner, Jr. served on the Steering Committee, The Grover Conference; Program Committee, Assembly on Pulmonary Circulation, American Thoracic Society; Executive Committee, Pulmonary Circulation Assembly, American Thoracic Society; Planning Committee, Pulmonary Circulation Assembly, American Thoracic Society; and Board of Directors, Pulmonary Circulation Foundation.

Dr. Songwei Wu served as an Ad hoc reviewer for the *American Journal of Physiology*.

## **VI. BRIEF SUMMARY OF ACTIVITIES AND PROGRESS**

The Department of Pharmacology hosted visits from several scientists who participated in the Distinguished Scientist Seminar Series: Dr. Richard M. Weinshilboum, Mary Lou and John H. Dasburg Professor of Cancer Genomics, Director, Division of Clinical Pharmacology, Department of Molecular Pharmacology and Experimental Therapeutics, Mayo Medical School/Mayo Clinic, Rochester, Minnesota, presented a seminar entitled: “Pharmacogenomics: Science, Development, and Translation” on October 22, 2009. Dr. Edward Abraham, Professor and Chair, Department of Medicine, Spencer Chair in Medicine Science Leadership, University of Alabama at Birmingham, Birmingham, Alabama, presented a seminar entitled “Intersection Between Coagulation and Inflammation: The Secret Life of Coagulation Factors” on Thursday, December 10, 2009. Dr. Christopher M. Waters, Professor and Vice Chair, Department of Physiology, College of Medicine, University of Tennessee Health Science Center, Memphis, Tennessee, presented a seminar entitled “Mechanotransduction in Acute Lung Injury” on Thursday, March 4, 2010. Dr. Scott W. Ballinger, Associate Professor, Department of Pathology and Director, BioAnalytical Redox Biology Core, Diabetes Research Training Center, University of Alabama at Birmingham, presented a seminar entitled “The Mitochondrial Paradigm for Disease Susceptibility: Prehistoric Events Influencing Contemporary Disease Risk” on Thursday, April 22, 2010. Dr. Nicholas Morrell, Professor of Respiratory Medicine, Division of Respiratory Medicine, University of Cambridge, Addenbrooke’s Hospital, Cambridge, UK, presented a special seminar entitled “BMPR2 Mutations in the Pathobiology of PAH” on Wednesday, December 16, 2009.

Four students graduated from the Department of Pharmacology. Dr. Kevin M. Lowe's defense was on May 25, 2010. His dissertation was entitled "Analysis of the Pathologic Impact of Site Specific Accumulations of Extravascular Pulmonary Fluid." Dr. Troy Stevens served as his Major Professor. Dr. Lowe is a Hepato-pancreaticobiliary Surgery Fellow at Dallas Methodist Medical Center in Dallas, Texas. Dr. Ryan Viator's defense was on April 21, 2010. His dissertation was entitled "Oxygen Tension Controls Glucose Uptake and Metabolism in Endothelial Cells." Dr. Brian Fouty served as his Major Professor. Dr. Viator is completing a postdoctoral fellowship at LSU in New Orleans. Dr. Michelle Henesy's defense was on October 2, 2009. The title of her dissertation was "Regulation of ANP-stimulated cGMP Signals in Murine Leydig Cells." Dr. Thomas Rich served as her Major Professor. Dr. Henesy is Manager of Hospital Services for the American Red Cross in Birmingham, Alabama. Dr. Salina Gairhe's defense was on September 23, 2010. The title of her dissertation was "Myoendothelial Gap Junctional Signaling Regulates Pulmonary Arterial Smooth Muscle Phenotype." Dr. Ivan F. McMurtry served as her Major Professor.

Graduate Students: Glenda Parra-Bonilla was awarded a two-year American Heart Association Predoctoral Fellowship. Salina Gairhe received a travel award to attend the American Thoracic Society International Conference in New Orleans, May 14-19, 2010. She also received the Outstanding Graduate Student Award from International Student Services. Luai Hasoun received a scholarship grant from the Alabama EPSCoR Graduate Research Scholars Program.

Four faculty members were promoted in the Department of Pharmacology. Drs. Abu-Bakr Al-Mehdi, Thomas Rich, and Songwei Wu were promoted to Associate Professor. Dr. Mykhaylo Ruchko was promoted to Assistant Professor. In regard to teaching and training, Dr. Abu-Bakr Al-Mehdi was appointed Curriculum Coordinator, Human Simulation and Integrated Case Studies for the College of Medicine. He continues to serve as course director for the Medical Pharmacology course.

A new Nikon A-1 Spectral Confocal Microscope was purchased for the College of Medicine. This instrument is capable of capturing high-quality confocal images of cells and molecular events at high speed and enhanced sensitivity.

The instrument was obtained from the award of a NIH competitive instrumentation grant awarded to a team of collaborative investigators in the College of Medicine and the College of Engineering. Dr. Tom Rich is the principal investigator on the grant.

**2009-2010**  
**Summary of Scholarly Activities**  
**Department of Physiology**

**I. PUBLISHED JOURNAL ARTICLES, BOOK CHAPTERS, AND PATENTS**

Cohen MV, Yang X, Downey JM. A<sub>2b</sub> adenosine receptors can change their spots. *Br J Pharmacol* 2010 Apr;159(8):1595-7.

Downey J, Cohen M. Endogenous mechanisms of cardioprotection. In: Hausenloy DJ, Yellon DM, editors. *Cardioprotection*. Oxford, England: Oxford University Press; 2009. Chapter 8. p. 79-87.

Hamanaka K, Jian MY, Townsley MI, King JA, Liedtke W, Weber DS, Eyal FG, Clapp MM, Parker JC. TRPV4 channels augment macrophage activation and ventilator-induced lung injury. *Am J Physiol Lung Cell Mol Physiol* 2010 Sep;299(3):L353-62.

He L, Hou X, Kanel G, Zeng N, Galicia V, Wang Y, Yang J, Wu H, Birnbaum MJ, Stiles BL. The critical role of AKT2 in hepatic steatosis induced by PTEN loss. *Am J Pathol* 2010 May;176(5):2302-8.

Iliodromitis EK, Downey JM, Heusch G, Kremastinos DT. What is the optimal postconditioning algorithm? *J Cardiovasc Pharmacol Ther* 2009 Dec;14(4):269-73.

Liu Y, Yang X, Yang XM, Walker S, Förster K, Cohen MV, Krieg T, Downey JM. AMP579 is revealed to be a potent A<sub>2b</sub>-adenosine receptor agonist in human 293 cells and rabbit hearts. *Basic Res Cardiol* 2010 Jan;105(1):129-37.

Martens CJ, Ballard ST. Effects of secretagogues on net and unidirectional liquid fluxes across porcine bronchial airways. *Am J Physiol Lung Cell Mol Physiol* 2010 Feb;298(2):L270-6.

Nelson M, Ledoux J, Taylor M, Bonev A, Hannah R, Solodushko V, Shui B, Tallini Y, Kotlikoff MI. Spinning disk confocal microscopy of calcium signalling in blood vessel walls. *Microscopy and Analysis* 2010 Mar;24(2):5-8.

Rocic B, Bajuk NB, Rocic P, Weber DS, Boras J, Lovrencic MV. Comparison of antihyperglycemic effects of creatine and metformin in type II diabetic patients. *Clin Invest Med* 2009 Dec 1;32(6):E322.

Spadafora D, Hawkins EC, Murphy KE, Clark LA, Ballard ST. Naturally occurring mutations in the canine CFTR gene. *Physiol Genomics* 2010 Aug;42(3):480-5.

Townsley MI, Morisseau C, Hammock B, King JA. Impact of epoxyeicosatrienoic acids in lung ischemia-reperfusion injury. *Microcirculation* 2010 Feb;17(2):137-46.

Wang S, Lincoln TM, Murphy-Ullrich JE. Glucose downregulation of PKG-I protein mediates increased thrombospondin1-dependent TGF- $\beta$  activity in vascular smooth muscle cells. *Am J Physiol Cell Physiol* 2010 May;298(5):C1188-97.

Wu S, Jian MY, Xu YC, Zhou C, Al-Mehdi AB, Liedtke W, Shin HS, Townsley MI.  $Ca^{2+}$  entry via  $\alpha_{1G}$  and TRPV4 channels differentially regulates surface expression of P-selectin and barrier integrity in pulmonary capillary endothelium. *Am J Physiol Lung Cell Mol Physiol* 2009 Oct;297(4):L650-7.

Yang X, Cohen MV, Downey JM. Mechanism of cardioprotection by early ischemic preconditioning. *Cardiovasc Drugs Ther* 2010 Jun;24(3):225-34.

Yang XM, Liu Y, Liu Y, Tandon N, Kambayashi J, Downey JM, Cohen MV. Attenuation of infarction in cynomolgus monkeys: preconditioning and postconditioning. *Basic Res Cardiol* 2010 Jan;105(1):119-28.

Zhou C, Chen H, King JA, Sellak H, Kuebler WM, Yin J, Townsley MI, Shin HS, Wu S.  $\alpha_{1G}$  T-type calcium channel selectively regulates P-selectin surface expression in pulmonary capillary endothelium. *Am J Physiol Lung Cell Mol Physiol* 2010 Jul;299(1):L86-97.

## II. PUBLISHED ABSTRACTS

Ballard ST, Martens CJ. Measurements of unidirectional liquid secretion and absorption across porcine bronchial epithelium. *Ped Pulmonol* 2009 Oct;44(Suppl 32):244-5. Abstract no. 97.

Ballard ST, Martens CJ. How bronchial airways secrete thick mucus. *Am J Respir Crit Care Med* 2010 May;181:A6260. Available from: [http://ajrccm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A6260](http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A6260)

Francis M, Solodushko V, Taylor MS. Mathematical modeling of calcium signaling in porcine coronary arteries. *FASEB J* 2010;24:1065.13.

Jian MY, Thorneloe K, Townsley MI. Effect of GSK1016790A, a potent TRPV4 agonist, on lung endothelial permeability. *FASEB J* 2010;24:797.5.

Krieg T, Förster K, Xu Z, Rüdebusch J, Cuello F, Cohen MV, Downey JM. Cardioprotective  $A_{2b}$  adenosine receptors are localized to mitochondria rather than the sarcolemma. *J Mol Cell Cardiol* 2010 Mar;48(Suppl 1):S118. Abstract no. P-2-36-5.

Mayer A, Mouner M, Boothe P, Hashizume M, Parker JC. Modulation of TRPV4 Ca<sup>2+</sup> entry by cytoskeletal tension. Proceedings of the 87<sup>th</sup> Annual Meeting of Alabama Academy of Science 2010 Mar 30-Apr 1; Normal, AL. Abstract no. 67.

Methner C, Cohen MV, Downey JM, Krieg T. Both A<sub>2a</sub> and A<sub>2b</sub> adenosine receptors are necessary to reduce infarct size at reperfusion in mouse hearts. J Mol Cell Cardiol 2010 Mar;48(Suppl 1):S159-60. Abstract no. P-3-25-5.

Parker JC, Hashizume M, Mayer A, Mouner M. TRPV4 channel activation modulates barrier properties in cultured lung epithelial and macrophage cell lines. Am J Respir Crit Care Med 2010 May;181:A3020. Available from: [http://ajrcm.atsjournals.org/cgi/reprint/181/1\\_MeetingAbstracts/A3020](http://ajrcm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3020)

Spadafora D, Hawkins EC, Ballard ST. Progress in the search for CF-causing CFTR mutations in dogs. Ped Pulmonol 2009 Oct;44(Suppl 32):279. Abstract no. 179.

Torres RA, Drake DA, Solodushko V, Jadhav R, Smith ES, Rocic P, Weber DS. Slingshot-isoform specific regulation of cofilin activation during VSMC migration and neointima formation following vascular injury. FASEB J 2010;24:790.7.

Villalta PC, Rocic P, Townsley MI. Impact of cyclic strain on integrin expression in rat pulmonary microvascular endothelial cells, FASEB J. 2010;24:797.1.

Williams JM, Stockman SL, Lincoln TM, Pearce WJ. Postnatal maturation and hypoxic acclimatization modulate PKG-mediated activation of BK channels in ovine cerebral arteries. FASEB J 2010;24:979.2.

Yang J, Eliasson B, Smith U, Cushman SW, Sherman A. Inverse correlation of adipose cell size with insulin sensitivity in lean, healthy individuals. Proceedings of American Diabetes Association 70<sup>th</sup> Scientific Sessions; 2010 Jun 25-29; Orlando, FL; p. LB23. Abstract no. 82-LB.

Yang X, Xin W, Cohen MV, Rich T, Downey JM. Suppressed radical production by intracellular A<sub>2b</sub> adenosine receptors in rabbit cardiomyocytes. J Mol Cell Cardiol 2010 Mar;48(Suppl 1):S34. Abstract no. P-1-22-4.

### III. PUBLISHED BOOKS

### IV. INVITED PRESENTATIONS

Ballard ST. Invited speaker. How airways secrete thick mucus. Children's Hospital of Philadelphia; 2010 Apr 20; Philadelphia, PA.

Ballard ST. Invited speaker. CFTR mutations in dogs. University of Pennsylvania; 2010 Apr 21; Philadelphia, PA.

Cohen MV. Invited speaker. The biology and mechanisms of ischemic preconditioning. Unofficial satellite symposium of 2009 American Heart Association Scientific Sessions; 2009 Nov 15; Orlando, FL.

Cohen MV. Invited speaker. Cardioprotective A<sub>2b</sub> adenosine receptors are localized to mitochondria rather than the sarcolemma. XX<sup>th</sup> World Congress International Society for Heart Research; 2010 May 14; Kyoto, Japan.

Cohen MV. Invited speaker. Both A<sub>2a</sub> and A<sub>2b</sub> adenosine receptors are necessary to reduce infarct size at reperfusion in mouse hearts. XX<sup>th</sup> World Congress International Society for Heart Research; 2010 May 16; Kyoto, Japan.

Cohen MV. Invited speaker. Suppressed radical production by intracellular A<sub>2b</sub> adenosine receptors in rabbit cardiomyocytes. XX<sup>th</sup> World Congress International Society for Heart Research; 2010 May 13; Kyoto, Japan.

Downey JM. Invited speaker. Ischemic preconditioning and its elusive mechanism: protecting the ischemic heart. University College; 2009 Dec 1; London, England.

Downey JM. Invited speaker. A<sub>2b</sub> receptors in cardioprotection. Adenosine A<sub>2b</sub> workshop; 2009 Dec 5; Padova, Italy.

Downey JM. Invited speaker. Can preconditioning be put to good use? Jos Spaan Retirement Symposium on Cardioprotection; 2010 Feb 19; Amsterdam, The Netherlands.

Downey JM. Invited speaker. Ischemic preconditioning, the key to protecting the heart. Anesthesia Grand Rounds. University of Rochester; 2010 Apr 8; Rochester, NY.

Downey JM. Invited speaker. Redox signaling in cardioprotection. XX<sup>th</sup> World Congress International Society for Heart Research; 2010 May 14; Kyoto, Japan.

Downey JM. Invited speaker. Protecting the ischemic heart. Peter Harris Distinguished Scientist Award. XX<sup>th</sup> World Congress International Society for Heart Research; 2010 May 14; Kyoto, Japan.

Downey JM. Invited speaker. Clinical cardioprotection: optimizing its translation. The Hatter Cardiovascular Institute Workshop 2010 Aug 17; Republic of Mauritius.

Lincoln TM. Invited speaker. Cyclic AMP dependent protein kinase and expression of smooth muscle specific genes. Experimental Biology 2010; 2010 Apr 27; San Diego, CA.



## **VI. BRIEF SUMMARY OF ACTIVITIES AND PROGRESS**

The Department of Physiology maintained excellent overall extramural funding for the 2009-2010 year. Drs. David Weber and Stephen Ballard were recipients of grants from NIH and the Cystic Fibrosis Foundation, respectively. Drs. Michael Cohen, James Downey, and Mary Townsley received awards provided by pharmaceutical companies. In total, the Department of Physiology has over \$2.5 million in extramurally funded awards over the past year.

Faculty in the Department of Physiology maintained high visibility in local, national, and international scientific communities. Several faculty members (Drs. Ballard, Downey, Lincoln, Taylor, Townsley, and Yang) presented external seminars and invited symposium talks at scientific meetings. Dr. Mary Townsley continues to chair the American Heart Association United Peer Review Steering Committee. Drs. Cohen, Downey, Lincoln, and Townsley all serve on the Editorial Boards of several scientific journals. Dr. Mark Taylor was named Director of the College of Medicine Imaging Core Facility. Dr. Townsley serves as Chair for the LCME Task Force, charged with a college-wide self-study of educational and academic programs.

Graduate student training activity continues this year with four Basic Medical Sciences (BMS) graduate students training in the Department of Physiology (Kiana Bradley, Michael Francis, Rebecca Torres, and Patricia Villalta). Departmental faculty sponsored Summer Medical Student Research students funded by the American Heart Association.

Teaching activities continue in the Department of Physiology. Dr. Townsley continued her role as course director for "Statistics and Experimental Design in Biomedical Research" and "Effective Scientific Writing." Dr. Lincoln continued as course director for Medical Physiology and Graduate Physiology Special Topics. Dr. Weber assumed the role of Director of the Vascular Biology Graduate Program, a focus area for Basic Medical Sciences. Physiology faculty continue to be actively involved in the Fundamentals of Basic Medical Sciences course offered in the first year. Dr. Mary Townsley continues to serve as the Principal Investigator on the NIH-funded Institutional Training Grant in Lung Biology.