

2009-2010
Summary of Scholarly Activities
Department of Cell Biology & Neuroscience

I. PUBLISHED JOURNAL ARTICLES, BOOK CHAPTERS, AND PATENTS

Alexeyev MF. Is there more to aging than mitochondrial DNA and reactive oxygen species? *FEBS J* 2009 Oct;276(20):5768-87.

Alexeyev MF, Fayzulin R, Shokolenko IN, Pastukh V. A retro-lentiviral system for doxycycline-inducible gene expression and gene knockdown in cells with limited proliferative capacity. *Mol Biol Rep* 2010 Apr;37(4):1987-91.

Förster K, Richter H, Alexeyev MF, Rosskopf D, Felix SB, Krieg T. Inhibition of glycogen synthase kinase 3 β prevents peroxide-induced collapse of mitochondrial membrane potential in rat ventricular myocytes. *Clin Exp Pharmacol Physiol* 2010 Jul;37(7):684-8.

Grishko V, Xu M, Wilson G, Pearsall AW 4th. Apoptosis and mitochondrial dysfunction in human chondrocytes following exposure to lidocaine, bupivacaine, and ropivacaine. *J Bone Joint Surg Am* 2010 Mar;92(3):609-18.

Howng SYB, Emery B, Traka M, Lin W, Watkins T, Cook S, Bronson R, Davisson M, Barres BA, Popko B. 191 is required for CNS myelination. *Genes Dev* 2010 Feb 1;24(3):301-11.

Kim JT, Ho R, Mates A, Wilson GL, Pearsall AW, Grishko V. Mitochondrial DNA damage involved in apoptosis caused by pro-inflammatory cytokines in human chondrocytes. *Osteoarthritis Cartilage* 2010 Mar;18(3):424-32.

Koczor CA, Shokolenko IN, Boyd AK, Balk SP, Wilson GL, LeDoux SP. Mitochondrial DNA damage initiates a cell cycle arrest by a Chk2-associated mechanism in mammalian cells. *J Biol Chem* 2009 Dec 25;284(52):36191-201.

Lin W, Lin Y. Interferon-gamma inhibits central nervous system myelination through both STAT1-dependent and STAT1-independent pathways. *J Neurosci Res* 2010 Sep;88(12):2569-77.

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 Ca²⁺ channel. *Am J Physiol Cell Physiol* 2010 Aug;299(2):C289-97.

Rachek LI, Yuzefovych LV, Ledoux SP, Julie NL, Wilson GL. Troglitazone, but not rosiglitazone, damages mitochondrial DNA and induces mitochondrial dysfunction and cell death in human hepatocytes. *Toxicol Appl Pharmacol* 2009 Nov 1;240(3):348-54.

Shokolenko IN, Alexeyev MF, LeDoux SP, Wilson GL. The approaches for manipulating mitochondrial proteome. *Environ Mol Mutagen* 2010 Jun;51(5):451-61.

Zhou M, Zhao Y, Ding Y, Liu H, Liu Z, Fodstad O, Riker AI, Kamarajugadda S, Lu J, Owen LB, LeDoux SP, Tan M. Warburg effect in chemosensitivity: Warburg effect in chemosensitivity: targeting lactate dehydrogenase-A re-sensitizes Taxol-resistant cancer cells to Taxol. *Mol Cancer* 2010 Feb 9;9:33.

II. PUBLISHED ABSTRACTS

Creighton J, Sayner S, Alexeyev M, Insel P. Adenosine monophosphate kinase promotes calcium signaling in lung endothelial barrier repair. *FASEB J* 2010 Apr;24:820.2.

Grishko V, Pearsall AW IV, Wilson GL. Local anesthetics exposure leads to mitochondrial oxidative stress and oxidative damage in human chondrocytes. *Proceedings of 9th World Congress of the International Cartilage Repair Society* 2010 Sep 26-29; Barcelona, Spain. p. 181. Abstract no. 17.4.2.

Grishko V, Pearsall AW IV, Wilson GL. TGF-beta protects OA chondrocyte mitochondria from experimentally induced oxidative stress. *Proceedings of the 9th World Congress of the International Cartilage Repair Society* 2010 Sep 26-29; Barcelona, Spain. p. 216. Abstract no. P109.

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

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

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

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-selectin upregulation and neutrophil recruitment into the alveolus. *Am J Respir Crit Care Med* 2010 May;181:A2666. Available from: http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A2666

Sayner S. Bicarbonate stimulation of endogenous soluble adenylyl cyclase, AC10, in pulmonary microvascular endothelial cells disrupts the endothelial cell barrier. *Am J Respir Crit Care Med* 2010 May;181:A3415. Available from: http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A3415

Sayner SL, Balczon R, Frank DW, Cooper DM, Stevens T. Targets of sub-plasma membrane versus cytosolic adenylyl cyclase activity demonstrate the bidirectional nature of the cAMP diffusion barricade that maintains endothelial barrier integrity. *Am J Respir Crit Care Med* 2010 May 1;181:A1037. Available from: http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A1037

Stevens TC, Robson M, Ochoa CD, Barry CF, Sayner S, Stevens T, Wu S. 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 May;181:A2665. Available from: http://ajrccm.atsjournals.org/cgi/reprint/181/1_MeetingAbstracts/A2665

Wilson GL, Shokolenko I, Snyder J, LeDoux S, Thompson A. Use of a fusion protein to enhance islet viability for transplantation. Proceedings of 70th Annual Meeting of the American Diabetes Association 2010 Jun 25-29; Orlando, FL. Abstract no. 2055-P. Available from: http://professional.diabetes.org/Abstracts_Display.aspx?TYP=1&CID=80966

Yuzefovych L, Wilson GL, Rachek L. Overexpression of hOGG1 in mitochondria prevents from palmitate induced mitochondrial dysfunction and inhibition of insulin signaling in rat skeletal muscle cells. Proceedings of 70th Annual Meeting of the American Diabetes Association 2010 Jun 25-29; Orlando, FL. Abstract no. 0149-OR. Available from: http://professional.diabetes.org/Abstracts_Display.aspx?TYP=1&CID=79094

III. PUBLISHED BOOKS

Fields PA, LeDoux SP, Wilson GL. The "how to" dissector for human anatomy for medical students. 6th ed. Mobile, AL: USA Publications Department; 2010, 75 p.

Fields PA. The "how to" dissector for human anatomy for physician assistants. 2nd ed. Mobile, AL: USA Publications Department; 2010, 75 p.

IV. INVITED PRESENTATIONS

LeDoux SP. Invited speaker. Targeting of DNA repair proteins to the mitochondria effects a phenotypic change. Society for Free Radical Biology and Medicine; 2009 Nov 20; San Francisco CA.

LeDoux SP. Invited speaker. Mitochondrial DNA repair in the central nervous system. Mitochondria Research School; 2010 Jun 28; Aarhus, Denmark.

LeDoux SP. Invited speaker. Targeting of DNA repair proteins to the mitochondria. Mitochondria Research School; 2010 Jun 29; Aarhus, Denmark.

Lin W. Invited speaker. Endoplasmic reticulum stress in disorders of oligodendrocytes. Genmed Seminar Series, Research Center for Genetic Medicine, Children's National Medical Center; 2010 Mar 18; Washington DC.

Lin W. Invited speaker. Activation of pancreatic endoplasmic reticulum kinase specifically in oligodendrocytes attenuates EAE-induced demyelination. National Multiple Sclerosis Society Tykeson Fellows Conference on Multiple Sclerosis; 2010 Jun 3; San Antonio, TX.

Rachek L. Invited speaker. Overexpression of hOGG1 in mitochondria prevents from palmitate induced mitochondrial dysfunction and inhibition of insulin signaling in rat L6 skeletal muscle cells. American Diabetes Association 70th Annual Meeting; 2010 Jun 28; Orlando, FL.

Sayner S. Invited speaker. Targets of subplasma membrane versus cytosolic adenyl cyclase activity demonstrate the bidirectional nature of the cAMP diffusion barricade that maintains pulmonary endothelial barrier integrity. American Thoracic Society International Conference; 2010 May 16; New Orleans, LA.

V. NATIONAL PROFESSIONAL RECOGNITION

Dr. Mikhail Alexeyev served as grant reviewer for the Italian Ministry of Health. He also served as a reviewer for *Aging Cell*, *Mitochondrion*, *Biology of the Cell*, *The International Journal of Biochemistry & Cell Biology*, *Human Molecular Genetics*, *Journal of Scientific Research*; *Journal of Zhejiang University*.

Dr. Ronald Balczon served as Ad Hoc reviewer for the Lytmos Group LLC.

Dr. Phillip Fields served on the Society for the Study of Reproduction Awards Committee.

Dr. Anthony Gard served as an Ad Hoc reviewer for *Journal of Neuroscience*.

Dr. Valentina Grishko served as an invited reviewer for *Nature Reviews in Rheumatology*, *Nature*, *European Journal of Pharmacology*, *Arthritis and Rheumatism*, *Free Radical Biology and Medicine*, *Osteoarthritis and Cartilage*, *Tohoku Journal of Experimental Medicine*.

Dr. Steve Kayes served as a Member of the Business Advisory Committee in the American Society of Parasitologists; served as a Moderator for the Bionet Parasitology Listserve at the University of Indiana; served as a Member of the Board for the Alabama Department of Rehabilitation Services; served as a reviewer for two grant applications for Gorgas Scholarships.

Dr. Susan LeDoux served as a Member of the NIEHS Environmental Health Sciences Review Committee; served on the Editorial Board, *DNA Repair*; served as President, Mitochondrial Research Society; served as a Member of the Cell and Developmental Biology and Biochemistry Item Writing Committee of NBME.

Dr. Wensheng Lin served as an ad hoc reviewer for *Laboratory Investigation*, *Expert Review of Neurotherapeutics*, *American Journal of Respiratory and Critical Care Medicine*, *Annals of Neurology*, *Human Mutation*.

Dr. Lyudmila Rachek served as a peer reviewer for *Diabetes UK*, Welcome Trust DBT India Alliance.

Dr. Sarah Sayner served as an ad hoc reviewer for *AJP Lung*; served as Chair for the Poster Discussion Session at the American Thoracic Society International Conference. Abstract from American Thoracic Society International Conference selected for the Assembly on Pulmonary Circulation Highlighted Abstract Award.

Dr. Glenn Wilson served on the Editorial Board of *Molecular Development and Aging*; served on the NIAAA Study Section; served on the NIEHS Study Section; served on the NIEHS Outstanding New Environmental Scientist (ONES) Study Section; served on the NIEHS Superfund Review.

VI. BRIEF SUMMARY OF ACTIVITIES AND PROGRESS

The Department places strong emphasis on both teaching and research. To enhance its research efforts, the Department sponsored visits from five distinguished scientists to meet with members in the Department and to present seminars on their research. Dr. John Corbett from the University of Alabama Birmingham presented a seminar titled "How Does Nitric Oxide Kill Beta Cells?" on October 15, 2009. Dr. Richard Loeser from Wake Forest University presented a seminar titled "Redox Regulation of IGF-1 and Integrin Signaling in Chondrocytes" on November 5, 2009. Dr. Clayton Mathews from the University of Florida presented a seminar titled "A Little Dissipation is a Good Thing: The Suppressor of Superoxide Production Locus" on January 14, 2010. Dr. Tak Yee Aw from Louisiana State University presented a seminar titled "Mitochondrial Redox Status and Cell Survival" on March 25, 2010. Dr. Gerald Shulman from Yale presented a seminar titled "Unraveling the Cellular Mechanism of Insulin Resistance: Implications for Obesity, Type 2 Diabetes and Lipodystrophy" on April 15, 2010.

In the area of education, the Department continued to provide over 30% of the instruction given to medical students in the first two years. The mean scores of our first year medical students on the mini board in both Gross and Developmental Anatomy and Cell Biology and Histology were over the 70th percentile. For second year medical students, the Department played a leading role in presenting the Neuroscience course. The class average on the Neuroscience mini board was over the 90th percentile for the third straight year. Clearly, this has become one of the top Neuroscience courses in the country. Also, remedial courses in Gross Anatomy were presented for medical students in the summer. This course was successful in helping specific students, predominantly from other schools, overcome their deficiencies. Faculty members from our Department taught Parasitology in the Medical Microbiology course and participated in the teaching of IDL I and IDL II, the Methods course and the Seminar course for first year graduate students. Moreover, they taught in IDL 630 and 631 for more advanced students. A course on Pelvic Anatomy was provided for Residents in the Department of Obstetrics and Gynecology. Additionally, Allied Health courses were presented on Gross Anatomy for both Physician's Assistant students and Physical Therapy students, Neuroanatomy for Physical Therapy Students, Histology for Biomedical Sciences students, and Anatomy and Physiology for Biomedical Science. Also, an Anatomy Laboratory was presented for Nursing Students. Finally, the Department presented two courses in the DREAM Program. The total teaching hours provided by the Department for the University was over 1360 hours.

In the area of community service, the Department expanded its efforts and provided health related education to 750 High School and Middle School students. Additionally, we played an integral part in the SCRUBS Program to attract students into the Medical Profession. The Department also presented a workshop for High School Science Teachers that was organized by the College of Education.

The Department added one new faculty member last year, Dr. Xiangming Zha, a Neuroscientist, who completed postdoctoral work at the University of Iowa.