# ZIJIAN XIE, Ph.D. CURRICULUM VITAE

# PERSONAL INFORMATION

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# **EDUCATION AND TRAINING**

B.S.	Pharmacy, Nanjing College of Pharmacy, Nanjing, P.R. China.
	1978-1982
M.S.	Toxicology, Chinese Academy of Medical Sciences, Beijing, P.R.
	China. 1982-1984
Ph.D.	Pharmacology, Medical College of Ohio, Toledo, Ohio. 1986-
	1990
Research Associate	Department of Pathology, Medical college of Ohio, 1990-1991
Visiting Res Asst Prof	Department of Cell Biology and Physiology, Washington University, School of Medicine, St Louis, 1992

# **EMPLOYMENT**

1984-1986	Associate Researcher, Institute of Food Safety Control and
	Inspection, Chinese Academy of Preventive Medicine
1991-1992	Instructor, Department of Pharmacology, Medical College of Ohio,
	Toledo, Ohio
1992-1996	Research Assistant Professor, Department of Pharmacology,
	Medical College of Ohio, Toledo, Ohio
1996-2000	Assistant Professor, Department of Pharmacology, Medical
	College of Ohio, Toledo, Ohio
2000-2005	Associate Professor (Tenured), Department of Pharmacology,
	Medical College of Ohio, Toledo, Ohio
2001-2005	Associate Professor, Department of Medicine, Medical College of
	Ohio, Toledo, Ohio
2005-	Tenured Professor, Department of Physiology, Pharmacology and
	Medicine

2008-	Scientific Director, Heart and Vascular Center
2008-	Member, Appointment, Promotion and Tenure Committee, UT

# Special Award for Sustained Research, School of Medicine, UT, 2009

# NATIONAL AND INTERNATIONAL PROFESSIONAL SOCIETIES AND ACTIVITIES

1985-86	Chinese Society of Toxicology
1987-1990	Society of Toxicology
1996-present	American Association for the Advancement of Science
1996-present	American Society for Biochemistry and Molecular Biology
1996-present	International Society for Heart Research
2002-2010	American Society of Cell Biology
2004-present	American Society of Physiology
2006-present	American Society of Pharmacology

#### **TEACHING ACTIVITIES, University of Toledo, College of Medicine**

A) <u>Lectures</u>	
1996-Present	Medical Pharmacology, medical school course (Antihypertensive drugs,
	Biochemistry and Genetics of Congestive Heart Failure, Drugs Used for
	the Management of Congestive Heart Failure, and Toxicology).
1996-present	Pharmacology, Physician Assistant Program (Antihypertensives, anti-
	lipemics, anti-angina, anti-arrhythmics, drugs for congestive heart failure, and toxicology).
1997-present	Signal Transduction, Graduate School course
1997-2003	Molecular Methods, Graduate School course
2005-present	Membrane Transporters, Graduate School course
B) <u>Small Group</u>	Review
1996 – 1999	Medical Pharmacology, Medical School course, eight sessions per year on
	cardiovascular pharmacology and pharmacokinetics.
1999 – present	System courses, cardiovascular drugs
C) <u>New Courses</u>	and Programs Developed (Medical College of Ohio)
1998 - present	Ions and reactive oxygen species in signal transduction.
1998 - present	ATPase, Molecular and Cellular Biology graduate program
2000 - present	Research in Cardiovascular Pharmacology
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D) Graduate Students:

I have had a total of twenty seven graduate students and served on more than 100 graduate committees. I have trained five post-doctors and three assistant professors. Four of my trainees have established their independent laboratories.

### STUDY SECTIONS, REVIEW PANELS

The Israel Science Foundation

Ad hoc reviewer 1997, 2002, 2008

Department of Veterans Affairs Ad hoc reviewer 1998-1999

American Heart Association Southern and Ohio Valley Research Consortium Section 4 Membrane transporters 2002-2003

NSF Ad hoc reviewer 2004, 2005, 2007

NIH MDCN4 Ad hoc reviewer 2002

NIH CMBK 2003-2004 Ad hoc reviewer Regular Member, 2005-2009

NIH Hypertension and Microcirculation 2006, 2008, 2009 Ad hoc

NIH Special Panel, ZRG1 DKUS-D 2011 Member

NIH MIST 2009-2011 Ad hoc MIST 2012-2018 Regular Member

#### <u>CHAIR AND/OR COMMITTEE MEMBER OF RESEARCH CONFERENCE AND</u> <u>SYMPOSIA (last six years)</u>

2005 Committee Member and Scientific Advisor, The 4<sup>th</sup> World Congress on Cellular and Molecular Biology.

2005 Conference Organizer, Molecular mechanisms of pump-, channel-, and transportermediated signal transduction. Poitiers, France, 2005

2005 Chair, Symposia "Regulation of cellular functions by the signaling pumps, channels and transporters". Poitiers, France

2005 Committee member, Ohio Physiology Society Conference

2006 Chair, Physiological Function of Ion pumps, Kyoto, Japan

2006 Advisor, The Third Key Symposium of Royal Swedish Academy of Sciences, Stockholm, Sweden

2009 External Examiner and Chair of Graduate Committee, Karolinska Institute, Stockholm, Sweden.

2010 Scientific Advisor, International Workshop on "Interactions of Cardiac Steroids and the Na<sup>+</sup>, K<sup>+</sup>-ATPase: Molecular, Physiological and Pharmacological Implications", Jerusalem, Israel.

2010-2011 Member, organizing committee, 13<sup>th</sup> International Conference on Na/K-ATPase and related P-ATPases, CA, USA

2011 Chair, Round Table Discussion, International Workshop on "Interactions of Cardiac Steroids and the Na<sup>+</sup>, K<sup>+</sup>-ATPase: Molecular, Physiological and Pharmacological Implications", Jerusalem, Israel.

# <u>SPECIAL/INVITED PRESENTATIONS AT NATIONAL AND INTERNATIONAL</u> <u>MEETINGS LAST SIX YEARS</u>

- 2005 The 11<sup>th</sup> International Conference on Na pump and related ion pumps, Woods Hole "Na/K-ATPase signalosome: the organization and its member"
- 2005 International Tea Research Conference, Hangzhou, P.R. China "Tea and Cardiomyopathy".
- 2005 The 4<sup>th</sup> World Congress on Cellular and Molecular Biology, Poitiers, France "Na/K-ATPase signalosome"
- 2005 Ohio Physiology Society Meeting, Dayton OH "molecular mechanism of Na/K-ATPasemediated signal transduction"
- 2006 The Third Key Symposium of Royal Swedish Academy of Sciences, Stockholm, Sweden "Na/K-ATPase Signalosome: the organization and its membership"
- 2006 Molecular Mechanism and Regulation in Cation Transport ATPase and Related Genetic Disease, Kyoto, Japan "Identification of a signaling pool of Na/K-ATPase"
- 2007 Gordon Research Conference, "Salivary Glands and Exocrine Secretion" Ventura Beach, California, "Na/K-ATPase Signalosome: The Organization and its Membership"
- 2007 The FASEB Summer Conference "Transport ATPase: Structure, Mechanisms, Genomics and Disease" Saxtons River, Vermont. "*Na*,*K*-*ATPase as a Signal Transducer*".
- 2007 The South American Cell Biology Conference "The Na/K-ATPase and Cell Signal Transduction". Mexico City, Mexico.
- 2007 Karolinska Institute, External Examiner "Na/K-ATPase and Signal Transduction, Li Juan", Stockholm, Sweden.
- 2008 The 12<sup>th</sup> International Conference on Na,K-ATPase and Related Transport ATPases of Ptype, University of Aarhus, Aarhus, Denmark "Na/K-ATPase in Cell Signal Transduction"
- 2009 The 8<sup>th</sup> National Conference of pediatric oncology, P.R. China "Old Drug as Potential Cancer Therapeutics"

- 2010 The 6<sup>th</sup> International ISP Congress and 14<sup>th</sup> International SHR symposium "The Na/K-ATPase/Src complex and cardiotonic steroid-activated protein kinase cascades", Montreal, Canada.
- 2010 New Frontiers in Science: Cell Biology of Recognition, Singapore.
- 2011 International Workshop on "Interactions of Cardiac Steroids and the Na<sup>+</sup>, K<sup>+</sup>-ATPase: Molecular, Physiological and Pharmacological Implications", Jerusalem, Israel "Molecular mechanism of Receptor Na/K-ATPase".
- 2011 APS education lecture, FASEB, Washington DC "Na/K-ATPase and Its Role in Signal Transduction".

#### INVITED LECTURES, SEMINARS, SYMPOSIA, VISITING PROFESSORSHIPS in LAST 5 YEARS

- 2004 Neuroscience Program, Vanderbilt University Medical School "Na/K-ATPase moonlights by dancing with Src"
- 2005 Department of Pharmacology, New York Medical College "Na/K-ATPase Signalosome"
- 2005 Department of Physiology, University of Maryland "Na/K-ATPase Signalosome: the organization and its member"
- 2005 Department of Physiology, Wright State University "Na/K-ATPase and Signal Transduction"
- 2006 Department of Pharmacology, Hebei Medical University, Shijiazhuang, Hebei, China "Targeting the Na/K-ATPase/Src complex for new drug development"
- 2006 Kunming Institute of Botany, Chinese Academy of Science, Kunming, Yuannan, China "The Na/K-ATPase signalosome as a target for new drug development"
- 2007 Department of Physiology, School of Medicine, University of Kansas "The non-pumping Na/K-ATPase and the cardiovascular actions of cardiotonic steroids".
- 2007 Nephrology, CASE School of Medicine "The non-pumping Na/K-ATPase and the cardiovascular actions of cardiotonic steroids"
- 2007 Children Hospital, Karolinska Institute "Tea and Heart" Sweden
- 2007 Sigma Tau, "Na/K-ATPase and Signal Transduction" Milan, Italy
- 2008 Department of Molecular Physiology, Yale University "The Na/K-ATPase/Src Complex and the pump/leak coupling"
- 2008 Department of Physiology, University of Michigan "The non-pumping Na/K-ATPase and the cardiovascular actions of CTS".
- 2008 Institute of Nephrology, Peking University, College of Medicine "Na/K-ATPase and Signal Transduction"
- 2008 Academy of Medical Sciences, Zhejiang, PR China "Targeting Na/K-ATPase/Src for development of new drugs"
- 2008 Department of Medicinal Chemistry, College of Pharmacy, UT "Na/K-ATPase as a new target for development of new therapeutics"
- 2009 Department of Physiology, Wayne State University "Physiological Relevance of the Receptor Na/K-ATPase and Endogenous Cardiotonic Steroids"
- 2009 Department of Physiology, Emory University School of Medicine "Na/K-ATPase and the formation of signalosomes"
- 2010 Department of Physiology. Yale University School of Medicine "Pump/leak coupling and salt sensitive hypertension"
- 2010 HD Biosciences Shanghai, China "Receptor Na/K-ATPase as a new drug target"

- 2011 Department of Molecular Genetics, Biochemistry and Microbiology, University of Cincinnati school of Medicine "Identification of Na/K-ATPase/Src complex as a new class of membrane receptors"
- 2011 Nemours Center for Childhood Cancer Research, AI De Pond Hospital, Wilmington, DE "Regulation of Cell Growth by the Na/K-ATPase"
- 2011 OmegaChem, Quebec, Canada "The Receptor Na/K-ATPase as a New Drug Target".
- 2012 Peking University Renal Institute "Na/K-ATPase as a broad receptor mechanism in signal transduction"
- 2012 Department of Physiology and Pharmacology, UT "Na/K-ATPase in Signal Transduction"

# **RESEARCH SUPPORT**

#### **CURRENT RESEARCH SUPPORT, TRAINING GRANTS**

(1) "Na/K-ATPase as an Integrator of the calcium-signaling machinery" NIH RO1 (GM 78565) 7/1/07-6/30/11 Principal Investigator

(2)

"Interactions of Na/K-ATPase with its signaling partners" Project II NIH Program Project Grant (HL-36573) 04/01/09-03/31/14 Project leader

(3)

"Na/K-ATPase as an Integrator of the calcium-signaling machinery" NIH RO1 (GM 78565) 10/1/07-6/30/11 Minority Fellowship, Sponsor

(4)
"Receptor Na/K-ATPase antagonists as novel therapeutics for renal/cardiac diseases" (HL109015-01)
NIH RO1
7/1/2011-6/30/2015
Principal Investigator

(5)
"Na/K-ATPase Reduction in Renal Disease-Related Cardiac Dysfunction" NIH RO1
HL105649-01A1 PI: Jiang Tian
12/15/2011-11/30/2016 Co-investigator 10%.

#### Pending

(1)
"The Na/K-ATPase as a Potential Salt Receptor" (GM-97672-01)
NIH RO1
7/1/2011-6/30/2015
Principal Investigator
16 percentile

#### PAST RESEARCH SUPPORT, TRAINING GRANTS

(1)

"Regulation of Na<sup>+</sup>/Pi Cotransporter in Skate Hepatocytes" Mount Desert Island Biological Laboratory 1997 Principal Investigator

(2)

"Structural Determinants of Oxidant Sensitivities of Sodium Pump Isoforms" American Heart Association, Ohio 07/01/96-06/30/98 Department of Pharmacology and Therapeutics Principal Investigator

(3)

"Regulation of Na<sup>+</sup>/Pi Cotransporter in Skate Hepatocytes" Mount Desert Island Biological Laboratory 1998 Department of Pharmacology and Therapeutics Principal Investigator

(4)

"Control of Cardiac Gene Expression by Cardiac Glycosides" American Heart Association, National 01/01/97-12/31/00 Principal Investigator

(5)"Control Mechanisms of Cardiac Proteins and Enzymes"NIH Program Project Grant03/01/98-02/28/03Core B

Project Leader

(6)"Regulation of Sodium Pump Gene Expression"NIH RO1 (HL-63238)04/01/00-03/31/05Principal Investigator

#### (7)

"Regulation of Src by P-type ATPase" AHA Postdoctoral Fellowship to Ting Cai 07/01/03-06/30/05 Sponsor

#### (8)

"The role of caveolae and caveolin-1 in Na/K-ATPase-mediated signal transduction" AHA Pre-doctoral Fellowship to Haojie Wang 07/01/03-06/30/05 Sponsor (9) "ROS and Na/K-ATPase in uremic cardiomyopathy" NIH RO1 HL67963-01 07/01/02-06/30/08

#### (10)

"Control Mechanisms of Cardiac Proteins and Enzymes" NIH Program Project Grant 03/01/03-02/28/09 Project III "interactions of Na/K-ATPase with its signaling partners" Project Leader

#### (11)

膜短距的細胞子短期的环腺彈時況 (Membrane Transporter as signal transducer and new drug target) Ministry of Science and Technology, PR China International Collaboration Grant 01/01/08-7/1/11 International Project Leader

#### Patents:

- 1. "Na/K-ATPase ligands" PCT Patent Application (PCT/US2007/002365)
- 2. "Na/K-ATPase-specific peptide inhibitors and activators of Src and Src family kinases" PCT patent application (US2007/023011)
- 3. "ECG and its derivatives thereof as Therapeutics for cardiac diseases" Chinese patent filed (2010)
- 4. "Na/K-ATPase-derived peptide Src inhibitor and ouabain antagonist and uses thereof" PCT patent filed in 2009
- 5. "Method regulating cell growth by causing ouabain-induced changes in expression of Na/K-ATPase and uses thereof as therapy for cancer" US provisional patent filed in 2009
- 6. "Identification of a new class of Na/K-ATPase ligands" PCT patent filed in 2010
- 7. "Using of NA/K-ATPase/Src receptor complex as a new drug target" Provisional patent,

2012

#### BIBLIOGRAPHY

#### Articles published in scientific journals:

- 1. Huang, W-H., Xie, Z., Kakar, S.S., and Askari, A.: Control of the sodium pump by liponucleotides and unsaturated fatty acids: side-dependent effects in red cells. Prog. Clin. Biol. Res. <u>268B</u>, 401-407, 1988.
- 2. Xie, Z., Wang, Y., Ganjeizadeh, M., McGee, R., and Askari, A.: Determination of total  $(Na^++K^+)$ -ATPase activity of isolated or cultured cells. Anal. Biochem. <u>183</u>, 215-219, 1989.
- 3. Xie, Z., Wang, Y., Askari, A., Huang, W-H., Klaunig, J.E., and Askari, A.: Studies on the specificity of the oxygen free radical effects on cardiac sodium pump. J. Cell. Mol. Card. <u>22</u>, 911-920, 1990.
- 4. Askari, A. Xie, Z., Wang, Y. Periyasamy, S.P., and Huang, W.-H: A second messenger role for monoacylglycerols is suggested by their activating effects on the sodium pump. Biochim. Biophys. Acta <u>1069</u>, 127-130, 1991.
- 5. DeTomaso, A.W., Xie, Z., Liu, G., and Mercer, R.W.: Expression, targeting and assembly of functional Na,K-ATPase polypeptides in baculovirus-infected insect cells. J. Biol. Chem. <u>268</u>:1470-1478, 1993.
- 6. Blanco, G., Xie, Z., and Mercer, R.W.: Functional expression of the  $\alpha_2$  and  $\alpha_3$  isoforms of the Na,K-ATPase in baculovirus infected insect cells. Proc. Natl. Acad. Sci. USA, <u>90</u>:1824-1828, 1993.
- Shen, P., Xie, Z.-J., Li, H., and Sánchez, E.R.: Glucocorticoid receptor conversion to high affinity nuclear binding and transcription enhancement activity in Chinese hamster ovary cells subjected to heat and chemical stress. J. Steroid Biochem. Mol. Biol. <u>47</u>: 55-64, 1993.
- 8. Blanco, G., DeTomaso, A.W., Koster, J., Xie, Z., and Mercer, R.W.: The  $\alpha$ -subunit of the Na,K-ATPase has catalytic activity independent of the  $\beta$ -subunit. J. Biol. Chem. <u>269</u>, 23420-23425, 1994.
- 9. Xie, Z., Jack-Hays, M., Wang, Y., Periyasamy, S.M., Blanco, G., Huang, W.-H., and Askari, A.: Different oxidant sensitivities of the  $\alpha_1$  and  $\alpha_2$  isoforms of Na<sup>+</sup>/K<sup>+</sup>-ATPase expressed in baculovirus-infected insect cells. Biochem. Biophys. Res. Commun. <u>207</u>, 155-159, 1995.
- 10. Lachant, N.A., Smith, M.R., Xie, Z., and Romani, W.R.: Heterogeneity of the aggregation response of human platelets to arginine vasopressin. Am. J. Hematol. <u>49</u>, 56-66, 1995.
- 11. Li, H., and Xie, Z.: Molecular cloning of two rat liver Na<sup>+</sup>/Pi cotransporters. Evidence for differential tissue expression of transcripts. Cell. Mol. Biol. Res. <u>41</u>, 451-460, 1995.
- Peng, M., Huang, L., Xie, Z., Huang, W.-H., and Askari, A.: Oxidant-induced activations of NF-κB and AP-1 in cardiac myocytes. Cell. Mol. Biol. Res. <u>41</u>, 189-197, 1995.
- 13. Jack-Hays, M., Xie, Z., Wang, Y., Huang, W.-H., and Askari, A.: Activation of Na<sup>+</sup>/K<sup>+</sup>-ATPase by fatty acids, acylglycerols, and related amphiphiles: Structure-activity relationship. Biochim. Biophys. Acta. <u>1279</u>, 43-48, 1996.
- 14. Peng, M., Huang, L., Xie, Z., Huang, W.-H., and Askari, A.: Partial inhibition of Na<sup>+</sup>/K<sup>+</sup>-ATPase by ouabain induces the Ca<sup>2+</sup>-dependent expressions of early-response genes in cardiac myocytes. J. Biol. Chem. <u>271</u>, 10372-10378, 1996.

- 15. Xie, Z., Wang, Y., Liu, G., Zolotarjova, N., Periyasamy, S.M., and Askari, A.: Similarities and differences between the properties of native and recombinant  $Na^+/K^+$ -ATPases. Arch. Biochem. Biophys. <u>330</u>, 153-162, 1996.
- 16. Liu, G., Xie, Z., Modyanov, N.N., and Askari, A.: Restoration of phosphorylation capacity to the dormant half of the  $\alpha$ -subunits of Na<sup>+</sup>/K<sup>+</sup>-ATPase. FEBS Lett. <u>390</u>, 323-326, 1996.
- 17. Li, H., Ruch, R., Ren, P., Onwochei, M.O., and Xie, Z.: Regulation of rat Na<sup>+</sup>/Pi cotransporter-1 gene expression: The roles of glucose and insulin. Am. J. Physiol. <u>271</u>, E1021-E1028, 1996.
- 18. Zhang, W., Lu, Q., Xie, Z-J., and Mellgren, R.L.: Inhibition of the growth of WI-38 fibroblasts by benzyloxycarbonyl-Leu-Leu-Tyr diazomethyl ketone: Evidence that cleavage of p53 by a calpain-like protease is necessary for  $G_1$  to S-phase transition. Oncogene <u>14</u>, 255-263, 1997.
- 19. Huang, L., Li, H., and Xie, Z.: Ouabain-Induced hypertrophy in cultured cardiac myocytes is accompanied by changes in expressions of several late response genes. J. Mol. Cell. Cardiol. <u>29</u>, 429-437, 1997.
- 20. Askari, F., Hitomi, Y., and Xie, Z.: Augmentation of ouabain sensitivity of rat liver Na/K-ATPase by in vivo adenovirus-mediated expression of the Na/K-ATPase  $\alpha_2$  subunit. FEBS Lett. <u>405</u>, 5-10, 1997.
- 21. Yu, C., Xie, Z., Askari, A., and Modyanov, N.N.: Enzymatic properties of human Na, K-ATPase  $\alpha_1\beta_3$  isozyme. Arch. Biochem. Biophys. <u>345</u>, 143-149, 1997.
- Huang, L., Kometiani, P., and Xie, Z.: Differential regulation of NaK-ATPase α-subunit isoform gene expressions in cardiac myocytes by ouabain and other hypertrophic stimuli. J. Mol. Cell. Cardiol. <u>29</u>, 3157-3167, 1997.
- 23. Kometiani, P., Li, J., Gnudi, L., Kahn, B.B., Askari, A., and Xie, Z. Multiple signal transduction pathways link Na<sup>+</sup>/K<sup>+</sup>-ATPase to growth-related genes in cardiac myocytes: The roles of ras and mitogen-activated protein kinases. J. Biol. Chem. <u>273</u>, 15249-15256, 1998.
- 24. Xie, Z., Kometiani, P., Liu, J., Li, J., Shapiro, J.I., and Askari, A. Intracellular reactive oxygen species mediate the linkage of Na<sup>+</sup>/K<sup>+</sup>-ATPase to hypertrophy and its marker genes in cardiac myocytes. J. Biol. Chem. <u>274</u>, 19323-19328, 1999.
- Xie, Z., Li, H., Kahn, B.B., Najjar, S.M., and Shah, W. Metabolic regulation of Na<sup>+</sup>/P<sub>i</sub>cotransporter-1 gene expression in H4IIE cells. Am. J. Physiol. Endocrinol. Metab. <u>278</u>, E648-E655, 2000.
- 26. Haas, M., Askari, A., and Xie, Z. Involvement of Src and epidermal growth factor receptor in the signal transducing function of Na<sup>+</sup>/K<sup>+</sup>-ATPase. J. Biol. Chem. <u>275</u>, 27832-27837, 2000.
- 27. Liu, J., Tian, J., Haas, M., Shapiro, J.I., Askari, A., and Xie, Z. Ouabain interaction with cardiac Na<sup>+</sup>/K<sup>+</sup>-ATPase initiates signal cascades independent of changes in intracellular Na<sup>+</sup> and Ca<sup>2+</sup> concentrations. J. Biol. Chem. <u>275</u>, 27838-27844, 2000.
- 28. Kometiani, P., Askari, A., Liu, J., Xie, Z., and Askari, F.K. Downregulation of cardiac myocyte Na<sup>+</sup>/K<sup>+</sup>-ATPase by adenovirus-mediated expression of an  $\alpha$ -subunit fragment. Am. J. Physiol. Heart Circ. Physiol. <u>280</u>, H1415-H1421, 2001.
- 29. Kometiani, P., Tian, J., Li, J., Nabih, Z., Gick, G., and Xie, Z. Regulation of Na/K-ATPase  $\beta_1$ -subunit expression by ouabain and other hypertrophic stimuli in neonatal rat cardiac myocytes. Mol. Cell. Biochem. <u>215</u>, 65-72, 2000.
- 30. Xie, Z., Liu, J., Malhotra, D., Sheridan, T., Periyasamy, S.M., and Shapiro, J.I. Effects of sodium pump inhibition by hypokalemia on cardiac growth. Ren. Fail. <u>22</u>, 561-572, 2000.

- 31. Xie, Z. Ouabain interaction with cardiac Na/K-ATPase reveals that the enzyme can act as a pump and a signal transducer. Cell. Mol. Biol. <u>47</u>, 383-390, 2001.
- 32. Chen, J., Feller, G.M., Barbato, J.C., Periyasamy, S., Xie, Z-J., Koch, L.G., Shapiro, J.I., and Britton, S.L. Performance in inbred rat genetic models of low and high running capacity. J. Physiol. 535, 611-617, 2001.
- 33. Tian, J., Gong, X., and Xie, Z. Signal transducing function of  $Na^+/K^+$ -ATPase is essential for ouabain's effect on intracellular  $Ca^{2+}$  in rat cardiac myocytes. Am. J. Physiol. <u>281</u>, H1899-H1907, 2001.
- 34. Periyasamy, S.M., Chen, J., Cooney, D., Carter, P., Omran, E., Tian, J., Malhotra, D., Xie, J., and Shapiro, J.I. Effects of uremic serum on isolated cardiac myocyte calcium cycling and contractile function. Kidney Int. <u>60</u>, 2367-2376, 2001.
- 35. Tomita, M., Irwin, K.I., Xie, Z., and Santoro, T.J. Tea pigments inhibit the production of type I (TH1) and type 2 (TH2) helper T cell cytokines in CD4+ cells. Phytother. Res.<u>16</u>, 36-42, 2002.
- 36. Mohammadi, K., Kometiani, P., Xie, J., and Askari, A. Role of protein kinase C in the signal pathways that link  $Na^+/K^+$ -ATPase to ERK<sub>1,2</sub>. J. Biol. Chem. <u>276</u>, 42050-42056, 2001.
- 37. Xie, Z. and Askari, A. Na<sup>+</sup>/K<sup>+</sup>-ATPase as a signal transducer. Eur. J. Biochem. <u>269</u>, 2434-9, 2002.
- 38. Haas, M., Wang, H., Tian, J., and Xie, Z. Src-mediated interreceptor cross-talk between the Na/K-ATPase and the EGF receptor relays the signal from ouabain to mitogenactivated protein kinases. J. Biol. Chem. <u>277</u>, 18694-18702, 2002.
- 39. Tian, J., Liu, J., Shapiro, J.I., Garlid, K., and Xie, Z. Involvement of mitogen-activated protein kinases and reactive oxygen species in the inotropic action of ouabain on cardiac myocytes. A potential role for mitochondrial K<sub>ATP</sub> channels. Mol. Cell. Biochem.242, 181-187, 2003.
- 40. Liu, J., Periyasamy, S., Gunning, W., Fedorova, O., Bagrov, A.Y., Malhotra, D., Xie, Z., and Shapiro, J.I. Effects of cardiac glycosides on sodium pump expression and function in LLC-PK1 and MDCK cells. Kidney Int., 62, 2118-2125, 2002.
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- 42. Xie, Z. Molecular mechanism of Na/K-ATPase-mediated signal transduction. Annals N.Y. Acad. Sci. 986, 497-503, 2003.
- 43. Liu, L., Mohammadi, K., Aynafshar B., Wang, H., Li D., Liu J., Ivanov, AV., Xie, Z., and Askari, A. Role of caveolae in the signal transducing function of cardiac Na+/K+-ATPase. Am. J. Physiol. 284, C1550-C1560, 2003.
- 44. Kennedy, D., Omran, E., Periyasamy, S.M., Nadoor, J., Priyadarshi, A., Willey, J.C., Willey, Malhotra, D., Xie, Z., and Shapiro, J.I. Effect of chronic renal failure on cardiac contractile function, calcium cycling and gene expression of proteins important for calcium homeostasis in the rat. J. Am. Soc. Nephrol. 14, 90-97, 2003.

- 45. Priydarshi, S., Valentine, B., Han, C., Fedorova, O.V., Bagrov, A.Y., Liu, J., Periyasamy, S.M., Kennedy, D., Malhotra, D., Xie, Z., and Shapiro, J.I. Effect of green tea extract on cardiac hypertrophy following 5/6 nephrectomy in the rat. Kidney Int. 63, 1785-1790, 2003.
- 46. Xie, Z. and Cai, T. Na+/K+-ATPase-Mediated Signal Transduction: From protein interaction to cellular function. Mol Interventions 3, 157-168, 2003.
- 47. Liu, J., Kesiry, R., Periyasamy, S.M., Malhotra, D., Xie, Z., and Shapiro, J.I. Ouabain induces endocytosis of the plasmalemmal Na/K-ATPase in LLC-PK1 cells by a clathrin dependent mechanism. Kidney Int. <u>66</u>, 277-241, 2004.
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