BIOGRAPHICAL SKETCH

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NAME: ZHENG, Hong

eRA COMMONS USER NAME (credential, e.g., agency login): ZHENG.HONG

POSITION TITLE: Assistant Professor, Basic BioMedical Sciences

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Peking University Health Science Center, Beijing, China	M.D.	7/1993	Medicine
University of Nebraska Medical Center, Omaha, NE	Postdoctoral	7/2005	Physiology

A. Personal Statement

My research interests are to define the neural control of cardiovascular and renal function in chronic heart failure and diabetes. The primary goal of my research is to elucidate the role of central nervous system (specific areas in brain) in the control of sympathetic outflow leading to regulation of blood volume under normal and altered during pathological disease states, such as heart failure and diabetes. I am also studying various aspects of the volume reflex in normal and disease states. In these studies, I have applied complementary methodologies in the whole animal to the cellular level, physiological recording sympathetic activity, cardiovascular and renal functions in conscious and anesthetized rats, viral gene transfection, $O_2^{\bullet-}$ and NO• measurements, immunohistochemistry, molecular biology techniques, microdialysis in combination with HPLC to measure the levels of various modulators and cell culture to investigate the signaling pathway. In a recent project, I will direct my attention to gain insight into the contribution of epithelial sodium channel regulation in altered sodium balance in chronic heart failure and the therapeutic benefits of renal denervation on sodium fluid retention endemic to chronic heart failure.

B. Positions and Honors

1999-2000 Attending Physician, Department of Cardiopulmonary Bypass, Cardiovascular Institution and Fuwai Hospital, Peking Union Medical College, Beijing, China
2007-2017 Assistant Professor, Department of Cellular and Integrative Physiology, University of Nebraska Medical Center, Omaha, NE
2017- Assistant Professor, Basic BioMedical Sciences, University of South Dakota, Vermillion, SD

Honors

2002-2004 Postdoctoral Fellowship, American Heart Association Heartland Affiliate
Van Harreveld Memorial Award of the American Physiology Society Central Nervous Section, Experimental Biology
Research Recognition Award of the American Physiology Society Central Nervous Section, XXXV International Congress of Physiology Sciences

C. Contributions to Science

The following URL is provided to the full list of publication as found in the publicly available digital database of MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/hong.zheng.1/bibliography/44112478/public/?sort=date&direction=ascending

1. My long-term research interests are to define the interaction of neurotransmitters/modulators within the central nervous system in regulations of sympathetic outflow and cardiovascular functions in chronic heart failure. The major findings in these studies include in heart failure, the inhibitory mechanisms mediated by nitric oxide and GABA are attenuated, while the excitatory mechanisms mediated by glutamate and angiotensin II are enhanced in the central nervous system. These alterations may contribute to the elevated sympathetic drive and cardiovascular complications observed in the disease conditions. Particularly, I have demonstrated that exercise training alleviates elevated sympathetic outflow in heart failure, through normalization of glutamatergic, angiotensinergic and nitric oxide mechanisms within the PVN. I served as co-investigator in all of these studies.

a. **Zheng H,** Katsuada K, Liu X, Knuepfer MM, Patel KP. Specific afferent renal denervation prevents reduction in nNOS within the paraventricular nucleus in rats with chronic heart failure. Hypertension. 2018 018 Jul 16. pii: HYPERTENSIONAHA.118.11071. doi: 10.1161/HYPERTENSIONAHA.118.11071. [Epub ahead of print] PMID: 30012866
b. Xu B, **Zheng H**, Liu X, Patel KP. Activation of afferent renal nerves modulates RVLM projecting PVN neurons. Am J Physiol Heart Circ Physiol. 2015 May 1;308(9):H1103-11. PMID: 25637549
c. Patel KP, Salgado HC, Liu X and **Zheng H.** Exercise training normalizes blunted central component of baroreflex response in rats with heart failure: role of the PVN. Am J Physiol Heart Cir Physiol. 2013; 305(2):H173-81. PMID: 23686710
d. **Zheng H**, Sharma NM, Liu X, Patel KP. Exercise training normalizes enhanced sympathetic activation from the paraventricular nucleus in chronic heart failure: role of angiotensin II. Am J Physiol Regul Integr Comp Physiol. 2012;303(4):R387-94. PMID: 22718804
e. Xu B, **Zheng H**, Patel KP. Enhanced Activation of RVLM projecting PVN neurons in rats with chronic heart failure. Am J Physiol Heart Circ Physiol. 2012;237(5): 570-7. PMID: 22307669

2. In particular, I am interested in investigating the aspect of neuro-humoral regulation of the circulation in the diabetic state. Through a series of in vivo and in vitro studies that have recently been published, we identified a novel signaling pathway in angiotensin II-superoxide contributing to sympatho-excitation in diabetes. I have further investigated interactions of neuro-humoral components (including dopamine, leptin, glutamate) regulation of cardiovascular functions in the cardiovascular diseases including diabetes. I attempted to define the precise mechanisms (dopamine, leptin-glutamate signaling) and interaction between specialized cells (neurons and astrocytes) within specific hypothalamic nuclei through TRPC channels contributing to the exaggerated sympathetic activation in diabetes. I served as the primary investigator or co-investigator in all of these studies.

a. **Zheng H,** Liu X, Li YL, Patel KP. A Hypothalamic leptin-glutamate interaction in the regulation of sympathetic nerve activity. Neural Plast. 2017;2017:2361675. doi: 10.1155/2017/2361675. PMID: 28845307
b. Nandi SS, **Zheng H**, Sharma NM, Shahshahan HR, Patel KP, Mishra PK. Lack of miR-133a Decreases contractility of diabetic hearts: a role for novel cross talk between tyrosine aminotransferase and tyrosine hydroxylase. diabetes. 2016 Oct;65(10):3075-90. PMID: 27411382
c. **Zheng H,** Liu X, Li Y, Mishra PK, Patel KP. Attenuated dopaminergic tone in the paraventricular nucleus contributing to sympathoexcitation in rats with type 2 diabetes. Am J Physiol Regul Integr Comp Physiol. 2014 Jan 15;306(2):R138-48. PMID: 24305061
d. **Zheng H**, Liu X, Patel KP. Centrally mediated erectile dysfunction in rats with type 1 diabetes: role of angiotensin II and superoxide. J Sex Med. 2013 Sep;10(9):2165-76. PMID: 23841890
e. Liu J, Tu H, **Zheng H**, Zhang L, Tran TP, Muelleman RL, Li YL. Alterations of calcium channels and cell excitability in intracardiac ganglion neurons from type 2 diabetic rats. Am J Physiol Cell Physiol. 2012; 302(8):C1119-27. PMID: 22189553

3. In addition to the contributions described above, with collaboration with Dr. Patel, I have previously shown that epithelial sodium channel (ENaC) subunit expressions and activity were increased in the kidneys from rats with chronic heart failure. I have recent evidence indicating that increased proteases in the tubular fluid

may contribute to the enhanced renal ENaC activity, providing a novel mechanistic insight for sodium retention commonly observed in heart failure. The long-term significance and direction of these experiments will be to gain insight into beneficial effects of renal denervation on sodium fluid retention endemic to chronic heart failure.

a. **Zheng H**, Liu X, Sharma NM, Patel KP. Renal denervation improves cardiac function in rats with heart failure: effects on expression of β-adrenoceptors. Am J Physiol Heart Circ Physiol. 2016 Aug;311(2):H337-46. PMID: 27288440
b. Patel KP, Xu B, Liu X, Sharma NM, **Zheng H**. Renal denervation improves exaggerated sympathoexcitation in rats with heart failure: a role for neuronal nitric oxide synthase in the paraventricular nucleus. Hypertension. 2016 Jul;68(1):175-84. PMID: 27185748
c. **Zheng H**, Liu X, Sharma NM, Li YL, Pliquett RU, Patel KP. Urinary proteolytic activation of renal epithelial Na+ channels in chronic heart failure. Hypertension. 2016 Jan;67(1):197-205. PMID: 26628676
d. **Zheng H**, Liu X, Rao US, Patel KP. Increased renal ENaC subunits and sodium retention in rats with chronic heart failure. Am J Physiol Renal Physiol. 2011;300(3): F641-9. PMID: 21159737
e. **Zheng H**, Patel KP. Integration of renal sensory afferents at the level of the paraventricular nucleus dictating sympathetic outflow. Auton Neurosci. 2017 May;204:57-64. PMID:27527558

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

R01 DK114663-1 08/15/17 to 4/30/22
Novel target mechanisms (renal denervation) to reduce sodium retention in chronic heart failure
The goal of this study is to determine if renal denervation reduces sodium retention in chronic heart failure via modulation of ENaC and protease-ENaC axis in the kidney.
Role: Co-Principal Investigator

USD Sanford School of Medicine Faculty Start-up Fund 2017-2022

Completed Research Support

R56HL124104 09/1/14-09/1/15
Role of HIF-1 alpha and renal afferent in activation of the PVN in heart failure
The goal of this study is to determine the activation of HIF-1α and/or ascending information from the renal nerves contributes to the increased sympathetic drive in heart failure.
Role: Co-investigator, PI-Kaushik Patel

R01 DK082956-02 03/01/09-02/28/14
Exercise Training Improves Erectile Dysfunction in Diabetes: Role of Central Mechanisms
The goal of this study is to provide new information regarding the central mechanisms involved in altered neural regulation of erectile function and therapeutic benefits of exercise training on erectile dysfunction in diabetes.
Role: Co-investigator, PI-Kaushik Patel

American Heart Association; National Scientist Development Grant 01/01/07-12/31/10
Enhanced sympathoexcitation in diabetes: roles of hyperglycemia, angiotensin II, oxidative and nitrosative stress.
The goal of this project study is to determine if chronic hyperglycemia induces up-regulation of central angiotensin II-superoxide signaling thereby contributing to sympathoexcitation in diabetic rats.
Role: Principal Investigator