BIOGRAPHICAL SKETCH

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NAME: Keisa Mathis

eRA COMMONS USER NAME (credential, e.g., agency login): kwill6

POSITION TITLE: Assistant Professor

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
Southern University	BS	05/2001	Physics
Purdue University	MS	08/2003	Applied Physics
LSU Health Sciences Center	MS	08/2005	Physiology
LSU Health Sciences Center	PhD	05/2009	Physiology
University of Mississippi Medical Center	Postdoc	05/2014	Physiology

A. PERSONAL STATEMENT

It has been fascinating to witness how my research focus has developed. I have long had interests in how the autonomic nervous system contributes to blood pressure regulation. As a graduate student, I studied how cholinergic drugs that enhance sympathetic nervous system activity are capable of improving hemodynamic counter-regulatory, as well as neuroendocrine and immune outcomes, to hemorrhagic shock in alcohol-intoxicated rodents[2]. A side project in the lab investigated whether chemical sympathectomy had effects on immune responses to hemorrhage[1]. During this time I learned of the cholinergic anti-inflammatory pathway, a novel neuroimmune pathway which may be effective in suppressing inflammation when stimulated. Thoughts of this pathway resurfaced during my postdoc when I was studying how aberrant immune function and chronic inflammation promotes hypertension in a mouse model of systemic lupus erythematosus (SLE). During my postdoc, I developed an independent proposal to study whether the cholinergic anti-inflammatory pathway is impaired in mice with SLE and if it contributes to the development of hypertension and renal injury. I obtained my first tenure-track faculty position as Assistant Professor as a result of successfully competing for the American Heart Association (AHA) Scientist Development Grant with this proposal. Now that I am in the process of establishing my laboratory, I will continue to study neuroimmune mechanisms of hypertension in diseases of chronic inflammation.

1) Whitaker A, Sulzer J, Walker E, **Mathis K**, Molina PE. Sympathetic modulation of the host defense response to infectious challenge during recovery from hemorrhage. *Neuroimmunomodulation.* 2010;17:349-358.
2) **Mathis KW**, Molina PE. Systemic administration of an acetylcholinesterase inhibitor improves outcome and survival from hemorrhagic shock during acute alcohol intoxication. *Shock.* 2010;34 (2):162-168.

Delays in Productivity and/or Advancement

- February-March 2010 (Maternity Leave)
- February-March 2012 (Maternity Leave)
- June 2014 (Transition to faculty position at new institution)
- February-March 2016 (Maternity Leave)

B. POSITIONS AND HONORS

Positions and Employment

07/2009-03/2010 Postdoctoral Fellow, Department of Physiology and Biophysics, University of Mississippi Medical Center, Jackson, MS

04/2010-12/2013	Instructor, Department of Physiology and Biophysics, University of Mississippi Medical Center, Jackson, MS
01/2014-05/2014	Assistant Professor, Department of Physiology and Biophysics, University of Mississippi Medical Center, Jackson, MS
06/2014-Present	Assistant Professor, Institute of Cardiovascular and Metabolic Diseases (formerly Department of Integrative Physiology and Anatomy), University of North Texas Health Science Center, Fort Worth, TX

Academic and Professional Honors

Scholarships and Fellowships

1997-2001	Timbuktu Scholarship, Southern University
1997-2001	Southern University Honors College Scholarship
2001-2003	Purdue University Fellowship
2005-2008	Predoctoral Fellowship-NIH-NRSA (T32), LSU Health Sciences Center Biomedical Alcohol Research Training Program
2008-2009	Merck/Porter Physiology Development Fellowship Program, American Physiological Society
2008-2009	K-12 Minority Outreach Fellowship, American Physiological Society
2010	Minority Supplement, National Institutes of Health
2010-2012	Postdoctoral Fellowship, American Heart Association
2012	Postdoctoral Fellowship-NIH-NRSA (T32), University of Mississippi Medical Center, Hypertension and Cardiorenal Diseases Research Training Program
2013	Postdoctoral Fellowship-NIH-NRSA (F32)

Other Honors and Awards

2008	NIDDK Minority Travel Award, American Physiological Society, San Diego, CA
2008	Travel Grant, Research Society on Alcoholism Satellite Symposium, Washington, DC
2009	Graduate Oral Presentation Competition (1st Place), Louisiana Academy of Sciences
2009	Gordis Award Finalist, Research Society on Alcoholism, San Diego, CA
2009	Caroline tum Suden Award, American Physiological Society, San Diego, CA
2009	NIDDK Minority Travel Award, American Physiological Society, San Diego, CA
2009	Travel Grant, Research Society on Alcoholism Satellite Symposium, San Diego, CA
2009	Student Merit Award, Research Society on Alcoholism, San Diego, CA
2011	Caroline tum Suden Award, American Physiological Society, Washington, DC
2011	FASEB/Minority Access to Research Careers (MARC) Program Poster/Oral Presentation Travel Award, Washington, DC
2011	Reviewer, Journal of Hypertension
2011	New Investigators Poster Award, International Society of Hypertension/American Heart Society High Blood Pressure Council, Orlando, FL
2012	Committee Appointment, Porter Physiology Development Committee, American Physiological Society
2012	Finalist, Postdoctoral Travel and Research Recognition Award, Water and Electrolyte Committee of American Physiological Society
2012	Co-Chair, Experimental Biology Featured Topic: Immune Cells, American Physiological Society (2012)
2012	NIDDK Minority Travel Award, American Physiological Society, San Diego, CA
2012	Finalist, Postdoctoral Travel and Research Recognition Award, Water and Electrolyte Committee of American Physiological Society
2013	Juan Carlos Romero Postdoctoral Excellence Award, Water and Electrolyte Committee of American Physiological Society of American Physiological Society
2013	APS Minority Travel Award, American Physiological Society, Boston, MA
2013	Editorial Board, Journal of Cardiovascular Disease
2014	Reviewer, Microcirculation
2014	Reviewer, Hypertension
2014	New Investigator Award, Council on the Kidney in Cardiovascular Disease, American Physiological Society, San Francisco, CA

2014-2018 Committee Appointment, American Heart Association Early Career Commission of the Council on the Kidney in Cardiovascular Disease
2015 Physiology 2015 Travel Award, The Physiological Society, Cardiff, Wales
2016-2018 Committee Appointment, Awards Committee, American Physiological Society
2016-2018 Committee Appointment, NCAR Steering Committee Science Policy and Communications Liaison Committee
2016 American Physiological Society Dale Benos Early Professional Career Service Award

Current Professional Society Memberships
2004-Present American Physiological Society
2009-Present American Heart Association

C. CONTRIBUTIONS TO SCIENCE

As mentioned, during graduate school I studied the effect of acute alcohol intoxication on the outcome to hemorrhagic shock while in the lab of Dr. Patricia Molina. Acute alcohol intoxication is involved in approximately one-third of all trauma cases and trauma is the fifth leading cause of death in the United States. Injured and hemorrhaged patients who are alcohol-intoxicated have lower blood pressure following the traumatic incident than their sober counterparts. In addition, the alcohol-intoxicated trauma victim has higher risks of end organ damage, greater susceptibility to subsequent infections, and higher mortality rates. It was speculated that the attenuated neuroendocrine response to hemorrhage is the principle mechanism mediating hemodynamic instability following blood loss during acute alcohol intoxication. We hypothesized that enhancing central nervous system cholinergic activity restores the neuroendocrine response to hemorrhagic shock and thereby improves hemodynamic counter-regulation and decreases morbidity and mortality in the alcohol-intoxicated host. The studies demonstrated that centrally-acting cholinergic drugs restored the neuroendocrine response and improved hemodynamic recovery, as well as survival, from hemorrhagic shock in the alcohol-intoxicated host[3-5]. I played a major role in designing and conducting these experiments, analyzing data and publishing the following journal articles related to this work:

3) **Mathis KW**, Zambell K, Olubadewo J, Molina PE. Altered hemodynamic counteregulation to hemorrhage by acute moderate alcohol intoxication. *Shock.* 2006;26(1): 55-61.
4) **Mathis KW,** Molina PE. Transient central cholinergic activation enhances sympathetic nervous system activity but does not improve hemorrhage-induced hypotension in alcohol-intoxicated rodents. *Shock.* 2009;32(4):410-415.
5) **Mathis KW,** Molina PE. Central acetylcholinesterase inhibition improves hemodynamic counter-regulation following severe blood loss in alcohol-intoxicated rodents. *American Journal of Physiology: Regulatory and Comparative Physiology.* 2009;297(2):R437-R445. PMCID:PMC2724230

As a postdoctoral fellow while in the lab of Dr. Michael Ryan, I studied mechanisms involved in the pathogenesis of hypertension. Although several effective therapies exist to effectively lower blood pressure, the prevalence of hypertension continues to rise, which makes such studies relevant. We studied the role of the renal sympathetic nerves and oxidative stress in the development of hypertension using a mouse model of lupus[6-7]. Recently, the immune system and chronic inflammation has been implicated in hypertension and we were able to demonstrate a role of B cells and autoimmunity in the development of lupus hypertension[9]. Our findings have re-open ideas suggesting hypertension has auto-immune origins and has lead others to believe that the mouse model of lupus is a useful model of hypertension because it is a genetic, spontaneous model, and the mice have chronic inflammation and renal injury[8]. I played a major role in designing and conducting these experiments, analyzing data and publishing the following journal articles related to this work:

6) **Mathis KW,** Venegas-Pont M, Masterson CW, Stewart NJ, Wasson KL, Ryan MJ. Oxidative stress promotes hypertension during systemic lupus erythematosus. *Hypertension.* 2012;59(3):673-679.
7) **Mathis KW**, Venegas-Pont M, Flynn E, Williams JM, Maric C, Dwyer T, Ryan MJ. Hypertension in an experimental model of systemic lupus erythematosus occurs independently of the renal nerves. *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology.* 2013;305(7):711-9.
8) **Mathis KW**, Broome HJ, Ryan MJ. Autoimmune mechanisms of hypertension. *Current Hypertension Reports*. 2014;16(4):424. (Review)

9) **Mathis KW**, Wallace K, Flynn E, Maric C, LaMarca B, Ryan MJ. Preventing autoimmunity protects from hypertension and renal injury. *Hypertension.* 2014;64(4):792-800.

During my postdoc I began my independent studies investigating neuroimmune mechanisms that may be involved in the development of hypertension. The cholinergic anti-inflammatory pathway is a vagally-mediated mechanism which leads to a reduction in inflammation following stimulation. Because hypertension is thought to be a disease of chronic inflammation, I hypothesized that this pathway is important in the development of the disease. I did preliminary studies to test the importance of this pathway using the model of hypertension I used as a postdoc, the *NZBWF1* mouse model of systemic lupus erythematosus. I found that when the cholinergic anti-inflammatory pathway is stimulated pharmacologically in lupus mice, hypertension and renal injury are prevented. These initial studies have led to abstracts and oral presentation at national conferences such as the American Heart Association Council on High Blood Pressure and Experimental Biology. There is an overall interest in these studies; I have been invited to speak on my findings at Experimental Biology 2015 and 2016, as well as an international conference in Cardiff, Wales, UK (Physiology Society) in 2015 and a FASEB Conference in the summer of 2016. Importantly, these findings have led me to develop additional hypothesis and propose studies that could benefit patients with hypertension, lupus, or other diseases of chronic inflammation. I played a major role in designing and conducting the studies discussed, analyzing the data and publishing the following abstracts related to this work. I have full confidence that these studies will be become published manuscripts.

10) **KW Mathis.** Evidence of an impaired neuroimmune pathway in autoimmune-associated hypertension. FASEB, Boston, 2015. (Abstract)
11) **Mathis KW**. An impaired neuroimmune pathway promotes the development of hypertension in the setting of chronic inflammation. *American Journal of Physiology: Regulatory*. 2015;309(9):R1074-7. (Review)
12) CI Maloy, AS Fairley, GS Pham, **KW Mathis**. Improvement in blood pressure and renal injury following vagal nerve stimulation. Submitted, Experimental Biology, San Diego, 2016. (Abstract)
13) GS Pham, AS Fairley, CI Maloy, **KW Mathis**. Chronic vagus nerve stimulation attenuates renal inflammation in autoimmune-induced hypertension. Submitted, Experimental Biology, San Diego, 2016. (Abstract)

Link to full list of published work:
http://www.ncbi.nlm.nih.gov/pubmed/?term=mathis+k+and+molina+pe+or+mathis+k+and+ryan+mj+or+mathis+k+and+park+s+or+mathis+kw

D. RESEARCH SUPPORT

Current

03/2016-02/2017
Research Seed Funding
UNT Health Science Center
Description: PI; Small amount of research funding to support medical student trainees

03/2015-09/2016
Intramural Grant Program
UNT Health Science Center, Division of Research & Innovation
Description: PI; Competitive grant to advance and accelerate the research programs of UNTHSC faculty

06/2014-05/2017
Institutional Start-Up Fund
UNT Health Science Center
Description: PI; Funds granted by the institution upon hiring

1/2014-12/2017
Scientist Development Grant (14SDG18320033)
American Heart Association
Description: Competitive independent award for young investigators

Completed
2/2013-12/2013
Postdoctoral Fellowship (1F32HL114272-01A1)
National Institutes of Health
Description: PI; Competitive postdoctoral fellowship

09/2012-01/2013
Postdoctoral Fellowship (2T32HL105324-03)
National Institutes of Health
Hypertension and Cardiorenal Diseases Research Training Program (University of Mississippi Medical Center)
Description: Trainee; Departmental training grant

07/2010-06/2012
Postdoctoral Fellowship (4350019)
American Heart Association
Description: PI; Competitive postdoctoral fellowship