

PHARMTOX QUARTERLY

PHARMACOLOGY & TOXICOLOGY QUARTERLY

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Understanding the Bladder - Dr. Nathan Tykocki

Dr. Tykocki's research focuses on urinary bladder physiology, with specific emphasis on the mechanisms responsible for the sensation of bladder fullness. His lab employs a multi-disciplinary approach, including biochemical, pharmacological, physiological and genetic tools, to understand how the bladder muscle, nerves, vasculature and urothelium communicate to impact bladder function. Their work discovered that:

1. Transient contractions of the bladder wall generate bursts of afferent nerve activity that dominate sensory outflow from the bladder; and
2. The vasculature of the urinary bladder, due to the unique physiological demands it experiences during bladder filling, possesses distinct contractile properties versus other vessels of similar size.

Two funded projects are currently underway in his lab. First, they are investigating how alterations in urinary bladder blood flow and vascular contractility affect bladder function, both normally and in diabetes. Second, they are exploring how the duration/intensity of social stress causes bladder dysfunction and determining the roles of transient receptor potential channels (specifically TRPV1) play in the progression of stress-induced bladder dysfunction.

Dr. Tykocki's scientific training explored vascular smooth muscle biology, physiology and pharmacology, specifically in terms of calcium signaling pathways as regulators of smooth muscle contractility. His fields of expertise include myography, receptor pharmacology, confocal microscopy, fluorescence microscopy, calcium imaging, western blotting, immunofluorescence, and instrument design/fabrication.

Reversing Chemical Exposure Injuries - Dr. Neera Tewari-Singh

Technological advances and increasing industrialization pose an enhanced risk of occupational and/or accidental exposure to chemical agents in addition to their potential use in warfare and terrorism. The major long-term goal of Dr. Tewari-Singh's research is to pursue both basic and translational studies to develop approved and more effective targeted countermeasures/therapies against mainly the dermal and ocular injuries from chemical threat agent exposures. The current chemical agents of interest include vesicating and nettle agents (sulfur mustard, nitrogen mustard, lewisite, and phosgene oxime), industrial agents/pollutants, and pesticides (chloropicrin, polycyclic aromatic hydrocarbons, etc.) that can cause harmful effects/mass casualties as well as long-term ailments to the human population. Developing effective and targeted medical interventions is a critical component of the modern global strategy to overcome the challenges of chemical emergencies in both civilian and military populations, making her research highly significant.

Current grants in the Tewari-Singh lab are funded from the National Institutes of Health-Countermeasures Against Chemical Threats (NIH-CounterACT) program and the Department of Defense (DoD)-Congressional Directed Medical research programs. The focus of studies under these grants is to investigate the role of mast cells and related inflammatory responses to elucidate skin, systemic, and/or lung injury mechanisms that contribute to severe toxicity from phosgene oxime (NIH-CounterACT), and chronic sulfur mustard exposure that could contribute to multiple illnesses in Gulf War veterans (DoD). Outcomes from these studies are anticipated to identify novel molecular targets for therapeutic intervention and further drug development to effectively treat injuries from these chemical threat agents. Under other collaborative projects, they are studying mechanisms and testing as well as optimizing therapies to treat ocular injuries from chemical threat agents (vesicating agents, chloropicrin, etc.) and ocular inflammatory diseases (diabetic and non-diabetic corneal inflammation and dry eye). Additionally, they are elucidating the role of aryl hydrocarbon receptor in polycyclic aromatic hydrocarbons-induced exacerbation in skin inflammatory diseases (psoriasis and atopic dermatitis) for better targeted treatment strategies.

Dr. Tewari-Singh has an extensive background in molecular biology, medical chemical defense and toxicology. In her lab, they integrate clinical and biological responses, molecular toxicology, biochemistry, signal transduction, immunology, imaging, and cutting-edge systems toxicology 'omics' tools to elucidate toxic mechanisms (mainly related to inflammation, DNA damage and oxidative stress). For these studies, they employ in vivo (mice, rats, rabbits, and mini-pigs), ex vivo (rabbit and human tissues) and in vitro (cell culture) model systems.



Nathan Tykocki, Ph.D.

Dr. Tykocki joined the Department of Pharmacology & Toxicology February 1st, 2019 as an Assistant Professor - tenure stream. He joins us from Robert Larner, M.D. College of Medicine, University of Vermont.



Neera Tewari-Singh, Ph.D.

Dr. Tewari-Singh joined the Department of Pharmacology and Toxicology January 1st, 2019 as an Assistant Professor - tenure stream. She joins us from Skaggs School of Pharmacy & Pharmaceutical Sciences, University of Colorado Denver.

PHARMTOX QUICKNOTES

SOT Mar 10-14 Baltimore, Md

Heading to Baltimore for Society of Toxicology's annual meeting? Join us Tuesday, March 12 from 9-11pm for MSU's Institute for Integrative Toxicology Alumni and Friends Reception.

Hilton Baltimore, Tubman AB Room
401 West Pratt Street, Baltimore, MD 21201



AACR Mar 29 - Apr 3 Atlanta, Ga

The AACR Annual Meeting program covers the latest discoveries across the spectrum of cancer research from population science and prevention; to cancer biology, translational, and clinical studies; to survivorship and advocacy and highlights the work of the best minds in research and medicine from institutions all over the world.



EB 2019 Apr 6-9 Orlando, FL

If you are heading to Orlando for Experimental Biology this year, make sure to join us April 6 from 7-10pm to help celebrate the 70th Birthdays of our Distinguished Faculty (Drs. Barman, Fink, & Haywood) and catch up with PharmTox Alumni! Room # to be sent out via Evite when assigned.

Rosen Centre Hotel
9840 International Drive, Orlando, FL 32819



Wrapping Up a Ph.D.

An interview with Ph.D. student, Kibrom Alula.

What do your last few months of the grad process look like?

It's mainly preparing for publications and finishing experiments. I had my final committee meeting which went well. My committee has been very helpful in guiding me. These people contribute so much to who you become.

What are your plans for after you defend? How did you decide this?

My plan is to find an entry level job in the industry where I can develop my career. In the industry you have science and technology, FDA regulation, and managing other people. It makes you a well-rounded person. Plan B would be to do post doc.

What is your current research?

My current research focuses on obesity-related hypertension in male and female rats. Obesity is a huge problem globally. There is a lot of risk of disease associated with obesity. The work is challenging, but it's fun.

Where do you see yourself in 10 years?

I would like to see myself become an expert in whatever field I end up in. I would also enjoy sharing my experiences with other people.

What do you enjoy most about being in the Ph.D. program?

It is exhausting mentally and physically, but it gives you a purpose, and that is very important. It forces you to think outside the box.

How did you end up at MSU for your Ph.D.?

I was born in Mekelle city in Tigray during a civil war and was raised in an orphanage. I did my undergrad at Calvin College and MSc at GVSU. I used to work in Grand Rapids for a professor at Van Andel research institution, he was the one who suggested I try to go to graduate school.



Kibrom Alula
Ph.D. Student
Pharmacology
& Toxicology

New Grants

1. Assessment of Exposure and Risk Associated with Cholesterol Oxidation Products in Food Using Dietary Intake Modeling. Awarded to: Dr. Cheryl Rockwell. Sponsor: MSU Center for Research on Ingredient Safety. \$50,000

2. Combination of a Novel Rexinoid and Apigenin for the Prevention and Treatment of Lung Cancer. Awarded to: Dr. Karen Liby. Sponsor: MSU Clinical and Translational Sciences Institute. \$25,000

Blast from the past



How many Pharmacology & Toxicology Faculty & Staff members can you identify in the photo?

Questions or comments? Something you'd like to share? Send us an email! We would love to hear from all of our alumni and friends. The more updates and news we get from our alumni, the more news and updates we will include in our communications!

Department Email: PHM@MSU.EDU



Upcoming Events:

Each of our seminars can be remotely viewed by connecting via Zoom. For Zoom connection information and more, visit our [Department webpage](#) and look at "Upcoming Department Events" on our main page.

March 01, 2019 at 1pm: Thesis Proposal Seminar with Yajing Ji (DO/Ph.D.) Neubig Lab

March 15, 2019 at 9am: Drug Discovery Seminar with Dr. Min-Hao Kuo (Michigan State University)

March 22, 2019 at 9am: Drug Discovery Seminar with Dr. Neal Hammer (Michigan State University)