PUBLIC HEALTH
TEXAS A&M UNIVERSITY

SPH Researcher of the Month

Natalie Johnson, PhD

Environmental and Occupational Health

Research Interests

- Inhalation & Development toxicology
- Maternal air pollution exposure
- Neonatal respiratory tract infections
- Childhood asthma
- Gene-environment interactions

Recent Awards

- ✓ Outstanding new Scientist (ONES) Award R01
- ✓ Ruth L. Kirschstein National Research Service Award (NRSA) Institutional Research Training Grant (Parent T32)

"Dr. Johnson is a classic blend of an energetic and effective researcher combined with compassionate educator. She consistently leads students thru class projects, research studies and extracurricular activities with professionalism and an upbeat attitude. Her colleagues are consistently outspoken about her exceptional contributions to the field along with a clearly upward trajectory in grantsmanship including her recent NIH R01." – Mark Benden, PhD, Department Head, Environmental and Occupational Health

Get to know Natalie Johnson …

***Q:** What is the strangest/most interesting/surprising place you have ever found yourself in the course of your research?*

A: Once, during my postgraduate training at John Hopkins University, I had to cross through a pack of runners in the Baltimore City Marathon to get to the lab on a Saturday morning by a certain time. I was in a rush to the lab to take my rats out of metabolism chambers in order to get exact 24-hour urine samples. To fully explain, I was conducting a cancer prevention study in a rat model looking at how activation of antioxidant response pathways can prevent liver tumors. We collected blood and urine samples over the course of the study to find biomarkers that may predict tumor development. In the case of crossing the pack of marathon runners, I had not realized that one of the collections fell on this day, but I knew I would get to the lab one way or another. Even with the streets shut down, I was able to make it to the lab on foot and get those samples! Overall, the study was successful, and we found complete protection against liver cancer in this model.

Other interesting places I have traveled to for my research includes many cities and towns in Ghana, where our study team evaluated an intervention to reduce dietary aflatoxin exposure (a potent foodborne liver toxin). I have also enjoyed working in Nanjing, China with collaborators studying prenatal air pollution exposure, the focus of my research program in the Texas A&M School of Public Health.

***Q:** What has been the biggest success to date for you personally?*

A: I consider the success of my trainees to be one of the most rewarding parts of my job. My first Masters student to graduate from SPH, Jairus Pulczinski, went on to pursue his PhD in toxicology. He helped me start the lab, and it is great to watch his career development. Dr. Kristal Rychlik was my first doctoral student. Her research in our mouse model revealed a window of immune suppression in the lung following prenatal exposure to air pollution. These findings served as the basis for my successfully funded NIH grant to further investigate how prenatal air pollution may increase infant susceptible to respiratory infections. It is fantastic to watch Kristal's career trajectory now as a postdoctoral fellow.

***Q:** What sparked your interest in Environmental Occupational Health as a field of study?*

A: Taking biochemistry courses as an undergrad peaked my interest in how the human body breaks down chemicals. To gain research experience, I volunteered in a toxicology laboratory the summer after my junior year. I was introduced to environmental exposures from food and air that impact human health. I presented my research at the Society of Toxicology meeting my senior year, and after this, I was hooked. I was enthusiastic to begin my journey in toxicological research and decided to remain at Texas A&M for my PhD since I had the opportunity to work on a clinical trial aimed at reducing foodborne exposures in a rural population in Ghana. Experiences in the field solidified my passion for environmental health, for instance, learning how many rural populations cook using biomass, which significantly contributes to maternal and child disease and death. The opportunity to research preventive interventions to decrease the burden of disease continues to fuel my passion for public health.

***Q:** What sort of impact do you hope your research will have?*

A: In our preclinical model, we are teasing apart how phytochemicals, such as those from broccoli and cruciferous vegetables, can upregulate protective enzymes in mothers exposed to air pollutants to prevent harmful effects on the developing fetus. In the future, I hope to translate this approach into populations unavoidably exposed to air pollutants, integrating simple dietary compounds into prenatal "preventive care" regimens to help reduce childhood respiratory disease. As a mom with two small kids, I hope my research can impact the health of mothers during pregnancy to ensure babies get the healthiest start in life.

***Q:** What advice would you give a student interested in pursuing research?*

A: Do not be afraid of failure. Perseverance in graduate school is much more important than perfection. Many times experiments will not work. Having the tenacity to keep addressing variables until experiments work will make you a successful researcher. For undergraduates, do not be afraid to start out volunteering. In my first experience in the lab, I started out washing dishes, packing boxes, and assisting on other projects. This ultimately led to me working on my own projects and eventually my dissertation project.

Recent Publications

- Zhang X, Johnson NM, Carrillo G, Xu X. 2018. Decreasing trend in passive tobacco smoke exposure and association with asthma in U.S. children. Environmental Research. 166:35-41.
- Carrillo G, Perez Patron MJ, Johnson NM, Zhong Y, Lucio R, Xu X. 2018. Asthma Prevalence and School-Related Hazardous Air Pollutants in the US-Mexico Border Area. Environmental Research. 162:41-48.
- Zamora ML, Pulczinski JC, Johnson NM, Garcia-Hernandez R, Rule A, Carrillo G, Zietsman J, Sandragorsian B*, Vallamsundar S, Askariyeh MH, Koehler K. 2018. Maternal exposure to PM2.5 in South Texas, a pilot study. Science of the Total Environment. 628-29:1497-1507.
- Livingstone MC, Johnson NM, Roebuck BD, Kensler TW, Groopman JD. 2017. Profound changes in miRNA expression during cancer initiation by aflatoxin B1 and their abrogation by the chemopreventive triterpenoid CDDO-Im. Molecular Carcinogenesis 56(11):2382-90.
- Johnson NM, Egner PA, Baxter V, Sporn MB, Sutter TR, Groopman JD, Kensler TW, Roebuck BD. 2014. Complete protection against aflatoxin B1-induced liver cancer with a triterpenoid: DNA adduct dosimetry, molecular signature and genotoxicity threshold. Cancer Prevention Research 7(7):658-65.
- Kensler KH, Dolan P, Slocum S, Johnson NM, Ilic Z, Sell S, Groopman JD, Kensler TW, Egner PA. 2014. Genetic or pharmacologic activation of Nrf2 signaling fails to protect against aflatoxin

Funding

- NIH R01 ES028866, Mechanisms of particulate matter driven infant respiratory disease, 12/15/17-11/30/22 Total award $2,068,455 – Principle Investigator

- NIH P30 ES023512, Pilot Grant, Maternal benzene exposure following Hurricane Harvey, 11/1/17-5/1/18 Total award $30,000 – Principle Investigator
- U.S. DOT Center, Pilot Grant, Border crossing emissions impacts study, 2/1/17-3/31/19
  Total sub-award $100,000 – Co-Principle Investigator (PI Joe Zietsman)

- NIH P30 ES023512, Pilot Grant, Comparison of post-Harvey environmental sampling and wristband results and translation of results to community residents and groups, 11/1/17-5/1/18
  Total award $30,000 – Co-Investigator (PI Robin Fuchs-Young)

- NIH P30 ES023512, Pilot Grant, Potentiation of preconception exposures and intrauterine environmental factors in a multiplex model of environmentally-induced dysgenesis, 11/1/17-5/1/18
  Total award $50,000 – Co-Investigator (PI Mike Golding)

- NIH T32 ES026568, Regulatory science in environmental health and toxicology, 4/1/16-3/31/21
  Total award $1,337,971 – Co-Investigator/Director of Diversity in Training (PI Ivan Rusyn)

- NIH R25 OD020219, The MENTORS Project, 8/1/16-7/31-21
  Total award $1,300,911 – Co-Investigator/Executive Committee Member (PI Robin Fuchs-Young)